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EDITORIAL

Recent Research in India. The Society of Biological Chemists, India have just brought out an Annual Review of Bio-chemical and Allied Research in India for the year 1940. It contains as many as sixteen articles contributed by eminent scientists of the day on important subjects. A perusal of the review reveals that the year under review has witnessed many important advances in our knowledge on various subjects, and to the student of agriculture this knowledge is indeed very valuable. For a full information on general nutrition, the reader is referred to a very valuable compilation by Gangulee, N. "Bibliography of Nutrition in India", Oxford University Press, London. No less than forty papers have been published during the year on vitamins. In regard to adulteration of foods, the year under review had seen greater determination on the part of the public and the administrators to put down the practice of adulteration of foods and drugs. The enactment of the Drugs Act and the formation of the Central Committee for Food Standards (*Current Science*, 1940, 9, 439) were significant events of the year. The output of scientific work in this field is also very encouraging.

The increased interest on the subject of Animal Nutrition and Dairy Science was maintained during the year, as shown by the fairly large number of publications. The publication, "Indian Indigenous Milk products" by W. L. Davies, Thacker Spink & Co., Ltd., Calcutta, deserves mention. In plant physiology, much valuable work has been done on the applied side, namely, vernalisation, water relations, the influence of mineral elements, physiology of crops and fruits, environmental influence on plants etc. Very important contributions have also been made on germination and viability of seeds, respiration in light, carbohydrate changes in plant tissue, and photoperiodism and radiation effects upon growth of plants. In mycology also much good work has been done. Luthra has given a review of seed-borne diseases of agricultural crops, the damage done by them and their methods of control. He has specially mentioned the smut and bunt diseases of cereals. Research in entomology has also been very active and most of the papers have been published in the *Indian Journal of Entomology*. Mention must be made about the valuable contributions dealing with insect pests of cotton and sugarcane, two of the most important money crops of India. The very fact that there has been an impressive output in the field of soils, fertilisers and manures shows the continued interest in this line of research. The Imperial Council of Agricultural Research appointed an *ad hoc* Committee of Soil Chemists in May 1939 to make recommendations for carrying out an All-India soil survey and

it is hoped that the Council of Research will shortly implement the recommendations made by the *ad hoc* Committee. On the problem of soil erosion and its control, much valuable work has been done. Physical and physico-chemical properties of soils have also been having their due share of attention. Soil organic matter and carbon transformations, soil nitrogen and nitrogen changes, plant nutrition and crop growth, technique of plot experiments and statistical analysis, utilisation of waste products of the sugar industry in agriculture, manures and fertilisers, manurial practice and crop production, all these important subjects have been engaging the attention of the workers in this broad and very important field of research. '*An Agricultural Testament*' by Howard, published during the year, deserves special mention, in that, in this he embodies his wide experience with Indian agriculture and a careful study of its problems. The book points out very clearly that for the agricultural success organic manure is essential since it alone produces humus, and humus is requisite for the mycorrhizal symbiosis between the plant roots and the soil which extensive experience has apparently shown to be fundamental. Plants grown under proper agricultural conditions, with plenty of aeration in presence of humus, are shown to be disease-resistant, and animals, including human beings, fed on such vegetables are also resistant to disease. Considerable amount of work has been carried out both in the laboratory and on the experimental farm and numerous results obtained. Though the stage is not yet reached when the findings of the experiments could be passed on to the poor cultivator in the village for increased production—which is the aim of all agricultural research in India—there is the satisfaction that the forward steps in this direction have been taken and it is hoped the day is not far off when there will be the full achievement of this object. The present war necessitates our endeavouring more and more as conditions are such that we have not only to be self-contained but also help the Empire in its time of need.

Production of Food Crops. We wish to draw the attention of our readers to a Press Note from the Director of Agriculture published in this issue, which gives an estimate of paddy and food crop cultivation in the Presidency, and suggests ways and means of improving the production both in quantity and quality. In the Madras Presidency, though seventy-five per cent. of the area cropped is normally cultivated under food crops comprising paddy, millets and pulses, yet in 1939-40, rice was as usual imported from Burma, Siam and Indo-China, to the tune of nearly 9,00,000 tons. The difficulty in so importing rice under the present war conditions is also pointed out, and it is urged that every cultivator and landowner in the Presidency should bestir himself to increase the production of food crops from his holdings to the utmost by intensive and extensive cultivation. It is an earnest hope that absentee landlords, tenants and landowning cultivators of this Province will co-operate with one another and very seriously consider the problem of increasing the production of food crops, whereby they will be not only in a position to make our country self-supporting but also help the Empire.

Some Noteworthy Features of Fruit Industry in Rajampet Taluk.*

By T. K. VISWANATHAN, B. Sc. (Ag.)

(The Kodur Fruit Growers' Co-operative Society, Rajampet.)

Introduction. *Suitability of the tract for fruit industry.* Rajampet Taluk in Cuddapah District is one of the most important fruit growing areas of the Presidency. This valley is bounded by Velikonda hills on the east and south and Seshachalam hills on the north and west. This tract is favoured by a fertile soil of considerable depth, good texture, plentiful supply of sub-soil water suitable for irrigation, freedom from cyclonic winds and proximity to the Madras market—factors eminently suited for making this orange belt famous in South India. This valley is also famous for the number of varieties of mangoes, limes and Sapotas, which it grows. But the commercial importance of mangoes and limes is shared by Chittoor and North Arcot districts. The success of the fruit industry depends not only upon the quality of the fruit produced, and additional wealth it brings to the individual fruit-grower but also on the cheapness with which it is marketed so that it is made available to the poorest citizen of the province. The importance of fruit production and consumption of fruits in an essentially vegetarian country like India cannot be over-emphasised.

Extent of cultivation area. Out of nearly 13,000 acres under "Tight jacket oranges" in our presidency nearly 4,000 acres are spread out in this valley. The total area under mangoes in this taluk is estimated to be 10,000 acres. Fortunately for the fruit industry the plantation of oranges in Rajampet Taluk in Rajampet area lies in a compact region and this contributes to the success of Co-operative operating methods. The acreage under this commercial planting of oranges has been steadily increasing as is shown below:—

1937-38	2,412 acres
1938-39	2,751 »
1939-40	3,740 »

It is believed that about three-fourths of the orange trees are still young and in a non-bearing stage, and year after year the production of oranges will be increasing and the problem of marketing such saleable produce is bound to assume increasing importance.

Varieties. The Citrus varieties in Rajampet Taluk are:— 1. *Chinee* or Sathgudi or Sweet orange—*Citrus sinensis* (L) Osbeck, 2. Acid lime—*Citrus aurantifolia* Swingle, 3. *Kamala*—*Citrus chrysocarpa* Hort. Ex-Tanaka, 4. *Kichili*—*Citrus maderaspatana*, Tanaka, 5. *Gajanimma*—*Citrus pennivesiculata*, Tanaka, 6. *Pomelo*—*Citrus grandis*, Osbeck, 7. *Billi*

* Paper read at the thirtieth College Day and Conference of the M. A. S. Union, July 1941.

kichill—*Citrus reshni*, Tanaka, 6. *Jamberi*—*Citrus jambhiri*, Lush, 9. *Gabuchinee*—*Citrus species*.

The most common mango varieties are, *Neelum*, *Bangalora*, *Rumani*, *Mulgoa*, *Pether*, *Khudds*, and *Kalipad*.

Cultivation methods. (a) Opening of new orchards:— The orchards are raised throughout the taluk as the soils are fertile with sub-soil moisture and at the same time providing easy drainage facilities. The plants are obtained both from the private nurserymen as also from the Government nursery. Most of the present bearing orchards are from seedlings. But now there is more demand for budded and graft plants than for seedlings. The planting distance for orange trees is 25 to 30 feet. The budded and graft plants are not so spreading in habit and so are given less spacing. Limes are planted 12 to 15 feet apart. Intercrops are raised till the orange plants reach their fifth year. The usual crops grown are turmeric, *ragi*, green manure, groundnut, etc.

(b) Maintenance of existing orchards:— The quality of fruit produced can be improved by regular cultural practices. Regular and timely irrigations, manuring in proper seasons, regular cultural operations and keeping the orchards free from diseases are all factors which decide to a great extent the quality of the fruit. The well kept orchards not only give a regular and high yield but also produce uniformly good quality fruits.

(c) Manuring, irrigation, yield, diseases and pests:—

Manuring. One of the most popular manurial practices in Rajampet taluk consists of application of groundnut cake— $\frac{1}{2}$ maund; bone meal—8 lb.; farm yard manure— $\frac{1}{4}$ to $\frac{1}{2}$ cart load to the bearing trees. In many orchards the application is done twice a year. There is a strong belief that the application in July stimulates the production of "gairangam crop" (second crop) which fetches a very high price in the fresh fruit markets. This special feature deserves to be exploited and popularised if it is found to be as efficacious as it is claimed to be. Investigation by research is required in this matter.

Irrigation. Irrigation of orange trees forms one of the most important practices on which however the growers in Rajampet usually possess no exact knowledge. The frequencies of irrigation, time at which it should be applied and the manner of application are all matters which vary from orchard to orchard. The influence of each of these on tree growth, fruit-shedding, tree yield and fruit quality requires to be investigated by research, so that the growers may have correct scientific information for their guidance in this important matter.

Yield. The yield of *chinee* trees varies widely. Some of the prolific bearers yield more than 3,000 fruits in the main season while poor yielders give not more than 100 fruits per tree. The performance of a tree can be greatly increased by proper cultivation, manuring, irrigation, spraying, etc.

But this improvement cannot be extended beyond a certain limit which is based on inherent characteristic of the parent tree.

Diseases and Pests. *Mottle leaf.* Disease seems to be very common in Rajampet taluk. Plants become weaker and yield is reduced. Spraying with zinc sulphate has been found to be useful. The Kodur Fruit Growers' Co-operative Society has purchased a sprayer and recently a spraying campaign has been started. Recent trials at Fruit Research Station, Kodur, indicate mottling may not be always due to zinc deficiency or may not always be cured by spraying of zinc sulphate. Application of several compounds like zinc sulphate, ferrous sulphate, manganese sulphate, boric acid and lime to soil, in small doses in a number of crowbar holes have been tried at the station with very interesting results. It has been found that some of the trees which do not respond to zinc sulphate spraying have been fully cured by this treatment.

Gummosis is also prevalent throughout the taluk. Application of Bordeaux paste after the removal of the gum and the bark with knife has been found useful.

Root rot. The whole tree becomes yellow and in course of time becomes weak, dries up and dies. Timely action such as digging up, exposure of the roots, removal of the affected and rotten roots and application of Bordeaux paste has proved beneficial.

The fruit sucking moth does havoc during the rainy season. Hand netting has been carried on by many orchard owners. The use of tomatoes as a catch crop has not been established, but is being advocated by the entomological section.

The flying foxes are a nuisance to growers causing a very heavy damage to orange crop. They are nocturnal in habit doing damage despite the owners engaging whole-night watchmen with guns. They usually prefer the biggest and the best sized fruits and when they fly from tree to tree and alight on fruit laden branches with their huge wings, cause more fruits to drop than are actually devoured by them and the fruits that drop down are unfit for export. Exploding devices such as crackers and guns helped little to scare away the birds. Fixing up of huge nets reaching great heights was tried as traps for these birds. A number of them were killed and the pest was fairly brought under control.

Oranges grown in different parts of India, present a striking contrast primarily due to climatic differences. Differences in varieties and seasons of maturity are likewise in sharp contrast. In Kodur area, for example, the fruit maturing season is from August to December, while in Rajampet area it is from November to March. Because of this difference in climate and soil, the fruit of the Kodur area cannot be safely kept on trees, beyond December, while those in Rajampet area can be kept till the end of March. Ecological considerations play therefore a very great part in influencing the

flowering of oranges. The second season fruits called the *gairangam* fruits (from June to August) are more profuse in Kodur area than in Rajampet area. This remarkable variation in time of blooming, fruiting and harvest in such closely situated areas as Kodur and Rajampet are not only of scientific interest but also of considerable practical value in that Rajampet Taluk is blessed with conditions very favourable for the harvest of oranges over a protracted period of the year.

The fruits of different seasons, *angam*, *gairangam* and *edagaru* need only to be briefly differentiated. The fruits of the main *angam* season taste much sweeter, are better coloured, more attractive and juicier than the other two off-season fruits. Despite the inferior quality of the off-season fruits they possess high market value and therefore form a highly welcome feature of the orange cultivation in this tract.

Although the orange trees in this taluk uniformly produce a very high crop of blossoms every year, the very frequent occurrence of heavy shedding of the flowers and fruits in the orchards results in keen disappointment to the growers. These annual losses are believed to be caused primarily by certain physiological disorders about the exact nature of which the growers are yet in the dark. Irregular and unstandardised cultural practices may certainly predispose the trees to these serious maladies and there appears to be a great scope for the horticultural advisers to educate the growers in the matter of improvement of these orchard practices.

Harvesting. The usual practice is to pull the fruits from the branches of the trees. The fruits are thrown down and are received by a man standing beneath the tree. This throwing of fruits is harmful in that though the fruits are not apparently damaged at that time, still they show dark patches and rot due to the hard compact. Hence fruits should be received in a canvas bag held by the person who picks the fruits on the tree.

The fruits owned by members are picked by coolies employed by them. The harvesting problem is two sided:—

1. The fruit must be handled carefully at all times.
2. Each picker should pick a sufficient quantity to keep the labour costs within reasonable limits.

1. Ladders are used to reach the heights of trees. As mentioned above while harvesting fruits a uniformly careful handling should be ensured. The fruits should not be injured during various operations. Careless handling results in a loss to the producer.

2. If the harvest is begun the practice in Rajampet taluk is to pick all the fruits of the trees in that particular row, with the result fruits of various degrees of maturity and sizes are harvested at the same time. But on the other hand if a garden owner were to go round each tree and pick such fruits which are best sized and properly matured it is impossible to keep labour costs within reasonable limits. It is a difficult problem to keep a

desirable relation between quality and quantity of the work. This quantity—quality work is secured through trained labour and more efficient supervision.

The picking cost also depends upon the size and age of the trees, the size and quality of the crop and lastly on the fruit season, weather and whether the crop is *Angami*, *Gairangam* or *Edagaru* crops. In the main *Angam* season the picking cost is much lower than during the *Gairangam* or *Edagaru* seasons. Thus the reduced yield in each tree in the off-season increases the picking cost.

After the harvest is over the fruits are taken in baskets to a packing shed. Here the fruits are spread on the floor, hand graded and counted and packed in baskets. The fruits were used to be packed with green leaves. But these spoil the fruits earlier due to the moisture they contain. Hence dry straw is now advocated as packing material. This is now being largely practised. The number of fruits in a basket depends upon the size of the fruits and varies from 60 to 90 per basket.

Marketing. Co-operative marketing vs. individual effort.

There is a widespread belief that if planting of gardens goes on at the present rate, fruit growing would soon become unprofitable as fruits will sell very cheap due to overproduction. This is entirely erroneous and is based on the misunderstanding of the whole situation. Our country with its varied climatic conditions and soils and cheap labour should be able to build up a decent trade in fruits. While there is a great room for improvement by (a) increasing average tree yield (b) improving the quality of the fruit and (c) reducing the cost of production there are ways for getting increased profits from orchards by reducing the middlemen's profit and undertaking co-operative marketing and ensuring a uniform distribution for a longer period. This can be achieved only by adopting co-operative methods and not by individualistic efforts. The success achieved by the Kodur Fruit Growers' Co-operative Society makes a study of the organisation of more than usual value.

In Rajampet taluk, as perhaps in the rest of the fruit growing areas of India, the common practice with small garden owners is to sell the fruits on trees to contractors or middlemen for one or even more seasons. The contractors are therefore responsible for picking, packing, and marketing the fruits, and usually do it in a manner suited to them not caring for the interests of the garden. They keep the fruits in the garden till very late in the season in order to get better prices, with the result trees get spoiled, manuring operations are delayed and irrigations become irregular and the flowering of the next year's main crop is considerably affected and the yield consequently reduced. In many cases the contractors when in need of money from the commission agents, gather immature fruits and spoil the market due to bad quality fruits. But in horticulturally advanced countries the fruit growers not only look to production side of fruits but take

very keen interest personally in marketing them. The co-operative organised efforts give them an opportunity to control the trade and regulate the distribution to suit the demand at any particular market.

It is perhaps not too much to say that the Rajampet fruit growers at present think that their responsibility ends with mere production of fruits and play almost no part in the further marketing of the same. This is because watching expenses are saved and other agricultural operations for crops like paddy, jonna and turmeric besides dry crops like horsegram demand their attention. Ignorance of marketing technique and lack of information regarding the market, stand in the way of their directly marketing the fruits.

But after the inception of the Kodur Fruit Growers' Co-operative Society during the year 1937 many have found the benefit in the society. In certain big areas like Nagavaram and a number of villages the entire produce goes through the society. Temporary advances are made by way of loans. The society has established fruit sale depots at Anantapur, Hindupur, Bangalore and Hyderabad. But the bulk of the produce goes to Madras from where the fruits are further consigned to southern districts like Madura, Tanjore, Trichy, etc. The progress of work done by the society during the year 1940—1941 is as follows:—

<i>Particulars.</i>	<i>Baskets.</i>	<i>Gross sales.</i>
1. Oranges	36,095	} Rs, 1,63,408.
2. Mangoes	2,561	
3. Limes	802	
4. Melons	1,763	
5. Sapotas	10	
6. Pineapples	184	
7. Betel leaves	30,418	

The society is undertaking from 1—8—41 one of the important functions of grading oranges at two important fruit growing areas and from these ware houses directly consign them to moffussal areas. The cheap, simple and efficacious "Kodur Chinese grader" devised at the Fruit Research Station, Kodur, which helps to grade the fruits into four sizes, namely, $2\frac{3}{4}$ ", 3", $3\frac{1}{4}$ " and $3\frac{1}{2}$ " will be used. The grading stations will also help to teach the growers the proper methods of harvesting, gathering, culling, grading and packing.

The society addressed the M. S. M. Railway authorities and got concessional rates for oranges to Madras, Bangalore, Anantapur, Hindupur and Hyderabad stations. The society is also moving the S. I. R. and M. S. M. Railway authorities to grant concessional rates to all important towns in South India.

Scope for improvement. The Fruit Research Station located in the important orange tract has already become very useful to growers in giving very valuable suggestions of a practical nature. Many of the intelligent growers are convinced that in due course results of research that is being carried on at the station will be of far reaching importance in removing

various uncertainties in the prevalent methods of orange culture, particularly in the matter of selections of stock, lay out of orchards, methods of cultivation, treatment of diseases, etc.

More intensive research in Fruit Canning and By-products are required as the work now being carried on at Kodur Research Station seems to be very much hampered, for lack of facilities. It is very difficult to rely on private nursery men but the growers throughout the Province are able to get the "real" plant from the Government nursery. But it is regretted that the Government is not at present able to raise enough plants to meet the demand and it is requested that the Government may be pleased to give necessary facilities. We are glad to note that the Government has decided to appoint a Fruit Specialist for our Province who will devote all his attention for improving the Fruit Industry.

On behalf of the Kodur Fruit Growers' Co-operative Society I have tried to present in this paper some of the salient features of the fruit industry in Rajampet taluk. I am sure it will be clear to all that there is a good deal to do towards making the fruit industry as prosperous as it has a right to be. The activities of the society has contributed its share to effectively ameliorate the condition of the growers. But this is not all. In the interest of the fruit growers who form a most important section of our rural population and in the interest of a still larger class of fruit consumers the society pleads for much greater assistance from the Government. While on the one hand we demand a marked extension of research and advisory activities on fruits, on the other we plead for more active assistance, by way of annual subsidy and also assistance in the matter of exploration of new markets and establishment of sale depots throughout the Province and outside, and an all-round extension of transportation facilities and of reduction of railway freights for our fruits. These are but very modest requests and we hope that they will be readily granted by the Government.

A Note on the Marketing of Cotton in the Regulated Cotton Markets of Berar and Bombay Presidency.

By M. JEEVAN RAO, B.Sc. (Ag.)

Secretary, The Adoni Cotton Market Committee.

In the following lines the marketing conditions in the regulated markets of Dhulia in Bombay Presidency, and Amraoti, Akola and Khamgaon in the Berar, are briefly summarised. Although the markets visited are but a few that are working in the Bombay Presidency and the Berar, they are the most important ones, and the conditions prevailing in these markets may be taken as representative.

Amraoti Market.

Of the regulated markets in Berar, the biggest is Amraoti with an annual transaction of about $1\frac{1}{4}$ lakhs of bales of cotton. This is a municipal market, and classified as a first class one. Amraoti is the headquarters

of the Commissioner, the Deputy Commissioner, the Deputy Director of Agriculture and various other Government officers. The place is situated at a distance of 6 miles from Badnera junction and is the terminus for the branch line Amraoti. The regulated cotton market in this place is constituted under the "Berar Cotton and Grain Markets Law of 1897" and its later amendments. The management of the market is vested with a committee consisting of 11 members, of whom one is from the District Council, one from the Municipal Council, one from the Cotton Sale Co-operative Society, four from cotton growers' constituency and four are from the cotton traders in the notified area. The chairman is elected from amongst the 11 members of the committee. There is a technically qualified secretary for the committee.

There were 40 registered buyers, 96 registered commission agents and 58 licenced independent weighmen, for this market at the time of the writer's visit.

The market is situated in the heart of the town in a site of about seven acres enclosed by a masonry compound wall and provided in all with six gates for the entry and exit of carts laden with cotton. At the main entrance is the Cotton Committee office building, the second floor of which is used as the council hall for holding meetings. There are buildings in the market yard for the accommodation of traders, agriculturists, commission agents etc. A reading room is also run with the committee funds within the market yard for the benefit of the public. The sanitary arrangements are excellent, and there are water troughs for cattle, and godown accommodation for keeping about 4,000 cotton bales. The secretary is provided with quarters in the market yard and adjacent to his, are situated quarters for a peon and a watchman. In the centre of the market is a neat and well kept park of about one acre in extent.

Working of the Market. The market opens at 5 A.M. The carts with kapas and cotton from the various villages, enter the market yard by the main gate and as they enter the commission agents or their nominees meet them and direct them to the stand allotted to the respective commission agent. If the cartman does not like to sell his produce through a commission agent he stands separately.

By about 6 A.M. when all the traders and commission agents would have come to the market yard, the committee publishes on the notice boards in prominent places in the market yard, the Broach and Oomra rates, with Liverpool and New York futures. According to the limits of their purchases the buyers open the rate for the day and inform the committee the range of prices. This is immediately published on the notice boards by about 6-15 A.M.

Then regular trading starts. The buyer goes to each of the carts examines the stuff and quotes his rate for the same under cover, the seller's commission agent acting as the intermediary. When the commission agent

thinks that it is a fair bargain, he informs the cartman accordingly. It is only when the cartman, who has previous instruction from his master accepts, that the commission agent openly declares the price for that cart and fixes up the same. Immediately an agreement form is filled up in duplicate. This contains the name of the buyer, the name of the seller, his village, district etc., rate per candy fixed and signatures of the commission agent and the purchaser. This form along with the committee's fee for the cart, (Rs. 0-1-0) is taken to the counter of the Market Committee office, where both the copies are signed by the committee servant. One copy is returned to the grower with the token for the cart for having paid the cart cess of Rs. 0-1-0. Most of the transactions in this manner are completed by about 8-30 A. M. The carts that were given the tokens find their way to the compounds of the various buyers or to the gin compounds, where weighing takes place. The tokens are handed over to the gate keeper, who shall not allow the carts to go out without returning them. The rate fixed in the agreement at the market yard is final and cannot be altered unless it be that the stuff is very bad inside and this be agreed upon mutually. Else these disputes are settled by the committee's secretary as per rules.

For example if a buyer, who fixed the rate for a cart of kapas in the market yard, finds the stuff to be of inferior quality or a mixture while weighing, he claims a reduction of rate with the consent of the seller's commission agent and the ryot, convincing them of the inferiority. If the ryot is not willing for the reduction, he has the option to complain to the committee for intervention, or sell it elsewhere or get it ginned. The commission agent gets his commission only when the full transaction gets settled. No deductions are allowed in kind.

Weightment. This is done by licensed weighmen, who are not servants of any private cotton concern or the committee; but are remunerated as per By-laws. No weighman is allowed to practise in a particular compound for more than a week continuously. The weightment is done in units of 56 Lbs. As soon as the kapas in the cart is weighed, the weighman gets the weights entered in the weightment book in the prescribed form and sends a copy of the same to the Amraoti Cotton Market Committee. Then the commission agent gets a *consolidated bill* from the buyer.

The agent draws the amount and pays the individual cartman or agriculturist in a prescribed form which is maintained in triplicate. One copy is given to the cartman, one is sent to the committee office and the third retained by him. The commission agent should by the above returns, account for in full the amount drawn by him from the buyer, to the satisfaction of the committee.

If the cartman is not desirous of selling his stuff the same day, he takes a token from the office paying one anna, stating that he is going to deposit the stuff in a ginning factory for either storing or for ginning. When kapas or lint is stored in godowns, actual charges are charged to the ryot. The

token is given at the gate of the market yard and the cart finds an exit. The gin owners after ginning, write on each *dokra* of lint, the date of ginning, name of the owner, name of ginning factory, gross weight of the *dokra* and weight of *batar*. When sale of lint takes place the transactions are settled on the above weight. But if the purchaser doubts, he can re-weigh them. Such instances are said to be very few. The market yard is clear of carts by about 3 P. M., when sweeping and cleaning are done and the market is kept tidy to receive the next day's arrivals.

Charity. No deductions are made but the Amraoti commission agents have formed into an association and pay to a charity fund one anna per every rupee of commission drawn.

The following appear to be the good points in this system of marketing : (a) The buyer, the commission agent and the seller have ample opportunities to examine the stuff and fix up rates. (b) For the commission received, the commission agent does really some amount of good to the ryot as well as to the buyer and the dealings are plain. (c) The payments are received the same day both by the commission agent and by his clients. (d) Better stuff gets better prices whatever might be the ruling market rates, thus inducing the ryot to get un-adulterated stuff. (e) The illiterate ryot is not lured with a *high price* for his produce and later subjected to enormous deductions. (f) The buyer has the satisfaction of having paid for the quantity and quality of stuff he requires. (g) The market committee has all opportunities to check the genuineness of the transactions. Thus weights are checked through the weighman *chitta*, and the rates offered through the agreement form signed in the market yard before taking the token for the cart. The consolidated bill handed over to the commission agent gives the details of that day's transactions by the buyer with the commission agent. The commission agent is responsible for disbursing the full amount received from the buyer, to the owners of cotton in full after making the deductions of amounts due to the commission agent, and this can be checked with reference to the receipts given by commission agents to the individual agriculturists.

This in brief is the system of marketing adopted in the Amraoti regulated cotton market in Berar. It is gratifying to note from the various reports of inspection of this market, recorded in the visitors' book, that the working of this market is excellent and that there is much co-operation between the buyer, seller, commission agent and the staff of the market committee. This market is opined to be the biggest kapas market in the world.

The Akola and Khamgaon markets are run on similar lines as that of Amraoti with the following main differences.

Akola Market.

The tokens issued to cartmen are of tin on which paper labels bearing the date are pasted, and they become obsolete for the next day. The market yard is about 4 acres in extent, and its capacity is about 60 to 70 thousand

bales per year. 14 buyers and 71 commission agents have registered themselves in this market. There are 78 licensed weighmen. The market does not start so early as in Amraoti.

Khamgaon Market.

The rates for the day are opened by a panel of three representatives from buyers, three from commission agents and one from the market committee. They closet themselves in a room, consider their limits of purchases and then declare the rates:

Deduction for moisture alone is allowed in the shape of weight.

There are in this market :— Registered buyers 15. Registered adityas 70. Licensed weighmen 65 (independent).

The market yard is 10 acres in extent enclosed by wire fencing, and the transactions average about 80,000 bales per year.

Dhulia Market of the Bombay Presidency.

The market at Dhulia in the Khandesh district of the Bombay Presidency is constituted under the Commercial Crops Markets Act of 1927 of Bombay and subsequent amendments. The act is similar to Act XX of the Madras Presidency. In this market, no person shall expose for sale or cause to be exposed unginned cotton or cotton waste at any place within the area of the market i. e., four miles from the centre of the market yard, other than the area declared as Cotton Market Yard. This market, I am told, is the biggest regulated market in Bombay Presidency, transacting annually 50 to 60 thousand bales. Here also the prices are offered by seeing the stuff in the market yard. No deductions in weights are allowed. After the bargain is struck in the market yard, an agreement as at Amraoti is signed and token from the market committee after paying the cart cess. The rest of the procedure is as at Amraoti.

The extent of the market is eight acres. The Dhulia market differs from the Amraoti Market in the following points :—

(1) There are commission agents for buyers as well as sellers, of course if the buyers and sellers so desire.

(2) The tickets (tokens) are punched as the carts get out of the market. Punched tickets cannot be used again.

(3) The commission agents make payments to the ryots even before they receive payment from the buyers. The commission agent is solely responsible for the payment of money to the ryot, for the produce, which he had caused to be sold to a buyer through him.

(4) *Pinjrapole*. This is charged at Rs. 0-2-6 per *boja* (392 lbs.) of lint, by the gin owners, when kapas is ginned by them. This amount is collected from the owner of kapas. For the purpose of this charge the owner of kapas is one, who has purchased the kapas in the market yard i. e.,

the buyer of kapas. If a ryot gets the kapas ginned in his own name only, without selling he pays *pinjrapole* charges after the ginning of the kapas.

When sales of cotton take place in the gin compounds, a report about the sale is sent to the Market Committee at Dhulia the same day in the form given.

The following general features are noted in all the markets:—

1. A commission agent is one who does not buy cotton either in his name or in partnership with others, which he sells as such agent; but he makes or offers to make a purchase or sale of any commercial crop or does or offers to do anything necessary for completing or carrying out such purchase or sale, on behalf of another person and in consideration of a commission.

2. All the licensed weighmen are independent and are not servants of any particular firm or person.

3. All samples are paid for.

4. Deductions are made only in terms of Rs. as. ps. in rates, except for moisture in Khamgaon.

5. The weighman *chitta*, the traders' purchase and sale accounts of the day and the commission agents' actual disbursement bills' duplicates are sent to the Market Committee, the same evening or by next morning for check.

Conclusion. One is very much impressed by the atmosphere of mutual trust and honesty in which all the transactions are being effected in these markets. There appears to be absolute co-operation and harmony amongst the sellers, buyers, commission agents, and growers. If these good points are adopted in all markets it will benefit all the classes of traders and enhance the prestige of the market.

Acknowledgements. I am very thankful to Messrs. R. H. Biyani, Chairman, and M. B. Chaobal, B. Sc., Secretary, The Amraoti Cotton Market Committee; Janab Mahmud Fajludin, Secretary, The Cotton Market Committee, Khamgaon and Mr. Y. V. Salunkhe, Superintendent, Cotton Market, Dhulia, for giving me all facilities to study the problems of marketing cotton in its various aspects and also for making my stay comfortable in the respective places. My thanks are also due to the chairman and members of the Adoni Cotton Market Committee for deputing me to visit these places and giving me an opportunity to study the marketing problems at close quarters.

Cultivation and Marketing of Virginia Tobacco.

By K. SANKARAI AH

Village Munsiff, Thumadu, Kandukur, Nellore.

"Economics of Farming" is a subject not well known to many an Indian farmer. Of all crops, production of flue cured Virginia Tobacco, otherwise called cigarette tobacco, is one which should not be attempted or continued if once begun, without studying its economics. In the Madras Province as elsewhere in India, the crop was first introduced by the Indian Leaf Tobacco Development Co., Ltd., some 15 years ago in the black cotton soils of the Guntur district, where it has occupied the whole tract and has also extended to Nellore, Kistna and Godavari Districts. (Vide. *Report on the Marketing of Tobacco in India and Burma—Page 31—A. M. A. 10/1400 Central Government.*) The ryots know only how much they get over the acreage they plant. They do not know where they err and fail to get deserving profits ultimately. They do not care to know where and how money should be advanced and skilled labour be made available. In this article I propose to deal more with the economic aspects of flue-cured tobacco.

In the districts named above, this has become the main crop that pays the agriculturist in the shape of money owing to its universal demand. The value of all omissions and commissions in doing a right thing will tell upon the nett profits, hence cultivation and marketing of the crop have to be studied under eight heads:—

1. Nurseries.
2. Manuring and preparation of land.
3. Transplantation and gap filling.
4. Interculture.
5. Topping and suckering.
6. Harvest and flue-curing.
7. Grading and marketing.
8. Pests and diseases. (Non-reeurring.)

Nurseries. In raising nurseries the following have to be attended to, manuring, preparation of beds to obtain a fine tilth, levelling beds with drainage channels around, sowing seed, hardening the beds, watering, rougeing, thinning, repairing drainage, top dressing of manure and application of Bordeaux mixture at intervals. The different operations can be done by a fixed number of labourers engaged for the whole season. It has to be explained how several duties can be performed by one set. The work has to be done gradually and slowly with due care. The whole area should not be sown on one and the same day for the reason that pulling the seedlings for planting has to be done at the same time when land may not be ready. The grower may not be able to command sufficient labour in the busy season of transplantation and rains may not permit him to carry on transplantation

every day. So, it should be the look out of a nursery man to have seedlings on a small scale, say about 10,000 a day. If plants are available in the beds beyond the planting capacity of the grower, they over grow, which will eventually affect the quantity and quality of the yield. Watering seed beds should be done from 8 A.M. to 4 P.M. while the working hours are from 7 A.M. to 5 P.M. ; every day we have an hour in the morning and one in the evening to divert the attention of the labourers for weeding etc. Besides on rainy days, when no watering is necessary, thinning out, repairing drains etc., should be attended to.

In 1939-40 I incurred the following expenditure, for raising nurseries in 25 cents of pure sandy soil and 20 cents of sandy clay soil. I engaged only two coolies per plot as water was available in the middle of each plot with a lift of 10 ft.

Cost of raising seed beds in 1939-40.

Particulars.	Rate.	Sandy soil 25 cents.		Sandy clay 20 cents.	
		Quantity.	Value Rs.,as.ps.	Quantity.	Value Rs.,as ps
Cattle manure	Rs. 0-12-0 per ct. ld.	6 cart loads.	4-8-0	4 cart loads.	3-0-0
Preparation of beds	Rs. 0-4-0 per head.	2 men on 8 days.	4-0-0	2 men on 8 days.	4-0-0
Collections of dry casuri- na leaves to cover beds.	do.	1 man on 1 day.	0-4-0	1 man on 1 day.	0-4-0
Sowing, watering etc. till pulling	do.	2 men on 90 days.	45-0-0	2 men on 90 days.	45-0-0
Cost of seed	Rs. 1-8-0 per lb.	8 ozs.	0-12-0	7 ozs.	0-11-0
Am. Sulphate-top dressing	Rs. 5-6-0 per cwt.	100 lbs.	4-12-0	80 lbs.	3-12-0
Total.			59-4-0		56-11-0

Number of seedlings obtained in proper season

(27-10-39 to 22-11-39)

1,22,700

90,700

Cost of 1000 seedlings

0-8-0

0-10-6

Inferences:— 1. Average cost of 1000 plants is 0-9-3.

2. Sandy soil is the best.

3. One cent of seed bed gives 5000 plants to plant one acre
planted at 3' apart.

The site for the nursery should be changed from year to year. Secondly the surface soil of the beds should be sterilised by burning trash over it before preparing it for sowing.

Manuring and preparation of land. It is important that the land should be thoroughly ploughed thrice, so that the artificial manure supplied to the land may be well incorporated into the soil and also a fine tilth is made for root development and preservation of moisture. Assuming that the previous manurial treatment and rotation are carried out as for any other crop, it is found necessary to apply artificial fertilizers to get mainly

the required quantity of Nitrogen, Phosphoric acid and potash. Most of the soils are deficient in these three plant foods. Hence artificial fertilisers are used. Some companies like Messrs. Parry & Co. and Shaw Wallace & Co. are the manufacturers of tobacco manure mixtures and the mixture costs Rs. 33 per acre. The analytical data of the fertilizer or the component ingredients are not revealed to the public, but is kept as a matter of trade secret. Hence I am not able to arrive at the proper value of the tobacco manure mixture. But reliable information on the subject of manuring of tobacco is available in (1) Indian Farming—September 1940, (2) Indian Farming—December 1940, (3) Indian Farming—April 1941, (4) Madras Agri. Journal—January 1941, (5) Madras Agri. Journal—March 1941, (6) J. A. R. I.—7—187 by Shaw & Kashi Ram., (7) Tobacco Culture by Taylor.

Expenditure per acre.

1. Cost of fertilizer (360 lbs.)	33 0 0
2. Clearing the land for cultivation	0 1 0
3. Drilling in the fertilizer with ground gorru for 1 day @ Re. 1/- per pair plus extra man sowing the fertilizer.	1 4 0
4. Three ploughings with country plough local rate (1 pair ploughs $\frac{2}{3}$ acre a day)	5 0 0
5. Harrowing finely with gorru twice and once with Guntaka and marking with the marker.	1 4 0
Total cost per acre.	40 9 0

Transplantation. Transplantation is to be done only in the evenings. Nothing can be done in the mornings except pulling the plants from the beds for evening work and this is done by seed-bed coolies without extra charge. Planting is done 3' apart from plant to plant and row to row, to encourage full development of leaf. Moreover a good spacing is very convenient for intercultural operations.

1. Five women transplant 5000 plants in one acre @ Re. 0-2-0 per day per head	0 10 0
2. Picking seedlings and supplying—one woman	0 2 0
3. Watering the plants if there be no rain that day or the previous day	1 4 0
4. Cost of seedlings per acre as arrived at before	2 14 0
Total cost per acre	4 14 0
5. Gap filling @ 10% of transplantation cost	0 8 0
Total cost per acre	5 6 0

Interculture. Intercultivation is done to eradicate weeds that come up after transplantation and create mulch which will not allow the sub-soil water to evaporate. Interculture commences a fortnight after transplantation by which time the plants take root firmly. From January to 15th March intercultivation should be done once in ten days. The cost of interculture is as follows :—

1. Six times intercultivation at 4 annas per acre	1 8 0
2. Hand picking of weeds that remain around the plant after interculture 3 times @ 2 annas per acre	0 6 0
Total.	1 14 0

Topping and Suckering. In case of flue-curing tobacco, topping is not usually done. It should be done only when it is known that the soil contains phosphoric acid sufficiently or when the crop development is poor. If done otherwise, the crop produces dark and coarse leaf which is unfit for flue curing. Topping too high may not give the desired result. Whether high or low, the cost of topping and suckering is the same.

1. $\frac{1}{2}$ man for topping an acre @ 4 annas per man	0	2	0
2. Six suckerings in the year @ 4 annas each suckering per acre	1	8	0
Total cost	1	10	0

N. B.—The above cost includes removal of tops and suckers to the manure pit.

Harvest and Flue Curing. Priming is an operation done before harvest and intended to remove the bottom most perished leaves which are very light and poor in quality. Such stuff will not pay even the cost of curing. If priming is done, access to free air to the bottom of the plant is made and chances for the insects to hide underneath are reduced.

One man clears one acre in $\frac{1}{2}$ a day. Harvest of ripe leaves which have attained orange yellow colour, is done in two or three stages according to the number of leaves borne on the plant. The interval between two harvests will be about 15–20 days. Lower most leaves are removed first and at each harvest the number removed per plant would be about 8–10. The leaves are collected in the evenings, and carted to the site of the barn and are made ready overnight for loading the barn the next day.

Barn construction. The first step in flue-curing is to have a good barn. The inner dimensions of a double furnace barn and a single furnace barn are 20' x 20' x 18' and 16' x 16' x 16' respectively, the thickness of the wall being $1\frac{1}{2}$ '. The bottom most tier should be 7' above the ground level and the vertical distance between two tiers should be $2\frac{3}{4}$ ', and they are arranged 4 feet apart. Terraced roofing is said to be better than corrugated sheet of iron. The cost of barn construction is given with a view to arrive at its depreciation value which is 10% on the capital cost. The annual depreciation value is divided by the number of probable curings in a year which may be taken as eight. On arriving at such a value per curing it can be calculated for 1 candy (500 Lbs.) of cured leaf which is the product of 5 candies of green leaf, this being the average yield per acre. Thus we arrive at the depreciation value to be added to 1 acre crop. (Vide A. R. I. Bul. 187, page 16.)

Construction of a barn and other equipment on contract basis at pre-war rates.

Specification.	Double furnace Barn.		Single furnace Barn.	
1. Foundation—2'— concrete lime mortar—Brick walls—20' x 20' x 18' x $1\frac{1}{2}$ ' thick-etc.	435	0 0	300	0 0
2. Causurina tier poles 22' long @ $1\frac{1}{2}$ rupees each.	45	0 0	30	0 0
3. Roofing with corrugated iron sheets.	135	0 0	95	0 0
4. Ventilators 12 ($1\frac{1}{2}$ ' x 1').	30	0 0	25	0 0

5. Flues (24 gauge steel sheet)	60	0	0	30	0	0
6. Furnaces @ Rs. 135 each.	270	0	0	135	0	0
7. Wet and Dry bulb hygrometer.	12	0	0	12	0	0
8. Curometer.	2	8	0	2	8	0
9. Petromax light.	12	8	0	12	8	0
10. Salter's spring balance. 300 lbs.	22	0	0	22	0	0
11. Lathis $4\frac{1}{2}'$ long $\frac{3}{4}"$ diameter @ Rs. 12 per thousand.	36	0	0	36	0	0
12. Misc. equipment. Mats 50—Dietz lanterns 3—shovel, stirrer—time piece—torch light—leaf weighing baskets—thatched shed $25' \times 12'$ etc.	56	11	0	33	0	0
Total. Rs.	1116	11	0	733	0	0

N. B. Cost of pandals not included as they will be used for housing cattle in summer.

Calculation of Depreciation Value.

Particulars.	D. F. Barn	S. F. Barn.
1. Capital cost,	1116 11 0	733 0 0
2. Depreciation @ 10% per annum.	111 11 0	73 5 0
3. „ per curing (8 curings per year.)	14 0 0	9 3 0
4. „ per acre.	7 0 0	9 3 0

Yield in one acre is taken as five candies and D. F. Barn holds 10 candies and S. F. Barn 5 candies of green leaf.

Curing the Leaf. The next step is curing the leaf. A double furnace holds 5000 lb. of green, that is the yield of two acres; while a single furnace one holds only 2,500 lb., the yield of one acre. On this basis expenses for curing are worked out. Though the figures of the ratio of the cured leaf to green leaf is 1:4:1 as per my records (*Vide infra*), I adopt the general opinion that it is 1:5. My result was obtained by maintaining optimum relative humidity and temperature in the barn as far as necessary the leaf having been in good condition. The ratio varies from season to season, soil to soil, and also according to the precautions taken at the time of curing. The curing expenses are as mentioned below:—

Particulars	D. F. Barn 5000 lbs.	S. F. Barn 2500 lbs.
1. Leaf picking-stringing-loading, unloading and bulking @ 1—8—0 per candy—(500 lb.)	15 0 0	7 8 0
2. Two firemen for 5 days @ six annas per day	3 12 0	3 12 0
3. Curer for 5 days @ 1 per day	5 0 0	5 0 0
4. Coal with cartage 1 and $1\frac{1}{2}$ ton @ 14—8—0 per ton	18 2 0	14 8 0
5. Rope 2 maunds for 3 curings @ Rs. 5 a maund	3 5 0	1 10 0
6. Kerosene oil for 1 petromax light—2 nights— $1\frac{1}{2}$ as. a day	0 3 0	0 3 0
7. Kerosene oil for 3 Dietz lanterns for 5 days @ 0—4—0 a day	1 4 0	1 4 0
8. Torch 3 cells for 3 curings 0—9—0/3	0 3 0	0 3 0
Total curing cost,	46 11 0	34 0 0

In a D. F. Barn curing cost per acre yield 5 candies of green leaf	23	6	0
In a S. F. " "	34	0	0
To the above add :—			

	D. F. Barn.	S. F. Barn.
Priming.	0 2 0	0 2 0
Depreciation.	7 0 0	9 3 0
Curing costs as mentioned.	23 6 0	34 0 0
Total.	30 8 0	43 5 0

Statistics of coal consumption.

Green leaf cured.	Coal consumed in lbs.
4586 lbs.	2278
5442 lbs.	2730
5415 lbs.	3026

7. *Grading and Marketing.* Grading is the final operation that determines the profit of the grower. Any slackness, intentional or un-intentional, will be an advantage to the purchaser since he will be ready to point out only defects to reduce the price on that score. The grading work is being done on a contract basis as follows :—

1. Grading and packing force 500 lb. of cured leaf	
@ Rs. 3 per candy of 500 lb.	3 0 0
2. Gunny—8 bales for 8 grades	1 0 0
3. String @ 0—1—0 per bale—8 bales	0 8 0
4. Supervising maistry over 10 graders—one day	0 4 0
5. Cart hire to market—6 miles	1 0 0
Charges for grading and marketing	5 12 0

While marketing, the purchaser offers a price and the seller may accept it if he likes. The rates are very fluctuating as may be seen from the following data.

1. The average price per candy of 500 lb.	Rs. 173 0 0	
2. The average return per acre (2500 lb. green leaf).	208 8 0	
3. The ratio of cured to green leaf	1:4:1	
4. The percentages of grades in cured leaf are as follows:—		
I Grade. 19.40%	III Grade. 16.70%	V Grade. Nil.
II " 35.50%	IV " 18.50%	VI " 9.90%
Total. 100.00%		

N. B.—Rate means cost of 500 lb. of cured leaf in the statement.

Grades,	Sale No. 1.			Sale No. 2.			Sale No. 3.		
	2620 lb. Green leaf.			2635 lb. Green leaf.			2667 lb. Green leaf.		
	Rate.	Wt.	Value.	Rate.	Wt.	Value.	Rate.	Wt.	Value.
	Rs.	lb.	Rs. as.	Rs.	lb.	Rs. as.	Rs.	lb.	Rs. as.
1	298	227	135-5	340	85	57-13	315	59	37-3
2	174	135	46-14	199	213	84-9	138	333	91-12
3	201	143	57-8	186	125	46-7	190	55	20-14
4	55	44	4-13	60	55	6-10	92	255	46-15
5	125	17	4-4	—	—	—	—	—	—
6	55	35	3-14	66	93	12-5	78	60	9-6
Total	—	601	252-10-	—	571	207-12-	—	762	206-2-

1934 lb. of cured leaf costs :— Rs. 666—8—0.

500 lb. of cured leaf costs. Rs. 176—0—0.

1934 lb. of cured leaf is obtained from 7952 lb. of green leaf.

Therefore the ratio of cured to green leaf is 1:4.1.

7952 lb. of green leaf paid Rs. 665—8—0.

2500 lb. of green leaf paid Rs. 206—8—0 from one acre.

Finally let us find out the nett profits per acre as follows :—

Particulars.	Receipt per acre.	Production cost.
	Rs. as. ps.	Rs. as. ps.
Average return for 1 acre—2500 pounds of green leaf	208 8 0	
Cultivation expenses per acre		40 9 0
Cost of seedlings and transplantation		5 6 0
Interculture		1 14 0
Topping and suckering		1 10 0
Priming, harvest (Flue-curing)		30 8 0
Grading and marketing		5 12 0
Total	208 8 0	85 11 0
Nett profit		122 13 0

If the leaf is cured in a single furnace barn the expenditure under curing is greater by about Rs. 12—13—0 i. e. nett profit will be less by this amount. In either case a deduction of land revenue has to be made as for the prevailing rate.

Pests and diseases. Besides various items of expenditure there is one other item i. e. control of insect pests, the cost of which depends upon the nature and extend of incidence.

During 1940—41 the nature of the crop was such that in spite of the most unfavourable year affected by abnormally heavy rains and insect damage the nett loss per acre came to Rs. 43. The average return per acre for both 1939—'40 and 1940—'41 comes to Rs. 40. Such bad years are very rare.

Though the nett profit per acre, i. e. Rs. 40, is higher than that for any other crop, considering the skill, intelligence, labour, time devoted and capital invested it is low for Virginia tobacco crop. It will be very profitable to grow this crop if the market and the quality of the produce are improved. It is worth doing. Though failures are sometimes inevitable, in favourable years it pays amply to meet the cash requirements of the agriculturists.

A Note on concentrated Seed Beds and Double transplanting of Paddy in the Nellore District.

By A. GOPALAKRISHNIAH NAIDU, L. Ag.

District Agricultural Officer, Nellore.

In the Nellore District, most of the tanks usually receive their full supply of water in October—November, after the break of the north-east monsoon. Sometimes, even the Kanigiri and other major reservoirs fed by the Pennar river irrigating nearly one hundred and fifty thousand acres, do not regularly get their full supply of water in July—August. In spite of these uncertain conditions of water supply, ryots persist in cultivating a long duration variety of rice called *Molagulukulu* for the reason that it sells at a comparatively high price and its quality is good. The yield of *Molagulukulu* when planted in July—August is high. However, its yield under late-planted condition is poor, and such late planted crops are invariably susceptible to the disease known as 'blast' (*Piricularia oryzae*) which is more or less endemic in the district. Consequently, ryots are forced to cultivate an inferior coarse variety of red rice known as *Isvarakora* or be contented with growing a crop of *ragi*, or other dry crops even though water is available in plenty late in the season. The demand for *Molagulukulu* rice, otherwise known as Nellore rice, in the market from upper and middle class people of the towns of the Southern and Central districts of the Madras Presidency is steady throughout the year. In the interest of the rice growers of the Nellore district and consumers in the urban areas of the Presidency, it is very necessary to increase the total output of *Molagulukulu* crop, as otherwise limited production would either tend to increase the price of this high class rice, or when price trend is downward, would lead to adulteration of the limited good quality rice with cheap inferior quality rices.

Apart from the improvement in the local *Molagulukulu* variety from the point of its yielding capacity and resistance to disease, the best way of tackling this problem of ensuring the cultivation of the long duration *Molagulukulu* variety on a larger scale in the district, appears to be to make the best use of the existing natural facilities of water supply by adopting the system of double transplanting. The principle involved in the double transplanting system is that the initial sowing of the seed bed should take place in the proper season, and thereafter the seedlings should be so reared that overgrowth is avoided or checked by proper control till finally planted out. Under the present conditions the interval between the date of sowing in the seed bed and final planting is too long and if left in good condition in the seed bed itself, the seedlings would become overaged and unfit for planting or if water is completely withheld the death rate of seedlings would be very high. In order to overcome this, it is suggested that the seedlings from the primary seed beds are to be planted out in a secondary nursery of

about 3 or 4 times the area of the first nursery. The planting of the seedlings in the secondary nursery gives a set back to the growth of the seedlings and at the same time it makes the seedlings, with better environment, grow hardy and robust to get over adverse weather conditions after they are finally planted late in the season.

Normally, about 5 acres of seed bed area are required to transplant 100 acres. Under the double transplanting system, seedlings from the primary seed beds are planted out in 15 to 20 acres which is the secondary or intermediate seed bed. Seedlings from this secondary nursery are then planted in about 100 acres. The proper season for sowing *Molagulukulu* in the first nursery in the delta area is first week of July (*arudrakarti*). Seedlings are allowed to grow in the first nursery for about 6 weeks before being planted in the secondary nursery, wherefrom they will be again fit for final planting in about 4 or 5 weeks. As one of the objects in this system is to conserve the limited available water supply to the best advantage, it is advised that the seed bed area under a canal or in a village should be as far as possible concentrated along the main channels. In the tank-fed areas the seed beds are similarly raised except that the first sowing may have to be delayed to the end of August or early September. If water supply to maintain the primary and secondary seed beds are not available in these areas, the ryots in the nearest delta area can make a trade in raising seedlings to supply their adjacent ryots cultivating paddy under tanks. Both the primary and secondary seed beds are to be prepared under wet conditions. Seedlings in the primary seed beds should not be allowed to grow more than a foot in height and if a tendency to overgrowth is noticed at any time it is better to withhold irrigation for a week or two prior to planting the seedlings in the secondary nursery. Seedlings pulled from the primary seed beds are to be planted very close, in twos or threes, in the secondary nursery so that all the seedlings are accommodated within the small area prepared as the intermediate seed bed. The secondary nursery should be maintained under wet conditions.

The adoption of the double transplanting system, wherever facilities are available, will enable the Nellore ryot to grow the long duration variety *Molagulukulu* in a larger measure than at present even in tank-fed areas, and eliminate to a great extent the inferior variety *Isvarakora*. In the Pennar delta this system will enable the ryots to grow a green manure crop in a portion of his holding during the period the seedlings are in the two nurseries. Further, the planting period can be prolonged to adjust the work to the limited available labour without detriment to yield. They can also raise seedlings for sale to the ryots of the non-delta areas.

This method was tried in small areas in a number of villages in the Nellore district in 1940-41 season. The results were quite encouraging to pursue the trial on a wider scale in the coming season. This system will be particularly useful to the Mopad project. Till now the largest area ever cultivated under this *ayacut* is 6,300 acres, in 1925-26, though the proposed

ayacut is 12,500 acres. The average area cultivated for the last 20 years is only 4,000 acres, and by raising paddy seedlings in concentrated seed beds and double planting them all the 12,500 acres can be brought under paddy cultivation with the limited quantity of water.

Summary. Double transplanting system is an expediency cultural practice to get over the adverse seasonal conditions in the Nellore district, for the cultivation of the quality rice *Molagulukulu* even late in the season in the place of *Isvarakora*, an inferior rice variety. If the principle of the system is properly understood and carried out on a co-operative basis, so far as seed beds are concerned, the limited water supply in the major reservoirs, minor tanks or wells, early in the season, may be economically utilised for rearing the primary and secondary seed beds in the proper season, and thereby ensure a normal crop even when finally planted late after the tanks get their supply with the break of the north-east monsoon.

EXTRACTS

The possibility of extending Cinchona cultivation in the British Empire By Sir Geoffrey Evans. The Cinchona plant is the base for the manufacture of quinine, which is still the most important specific for malaria, in spite of the advent of synthetic drugs, such as plasmoquine and atabrine. The former drug is not now in favour, as it is said to give rise to certain toxic effects. Atabrine is of German origin and is protected by patents. Its cost is high, and it is stated that the cost of treating one malaria case with it would be 49 sh. as against 1 sh. for a similar treatment with quinine. It is remarkable that about 90 per cent. of the quinine products consumed in the world to-day is produced in the Netherlands East Indies, and that only about 4 per cent. is made in British countries. It has been estimated that there are some 800 million people in the world to-day who suffer from malaria and that there are two million fatal cases annually. A large proportion of these casualties are British subjects. For example, the League of Nations Health Organization gives data showing that 100 million people in British India alone suffer from malaria, but only 8 to 10 million are treated annually, and in other tropical parts of the Empire conditions are much the same.

The increased consumption of quinine is largely a matter of price and, running concurrently of efficient propaganda. With lower prices, a wider knowledge of the nature of the drug and efficient means of distribution, the consumption could undoubtedly be largely extended. India alone consumes about 210,000 lb. of quinine per annum, of which 70,000 are produced in the country and 140,000 are made from Dutch East Indies bark. The real need for India is provision for 100 million sufferers, using 45 grains a year, which would require 600,000 lb. of quinine sulphate annually.

The price of the bark is the real crux of the question, and this is largely controlled at the present time by one organization which holds a practical monopoly, namely, the Kina Bureau of Amsterdam. This controls the production of bark in the Netherlands East Indies, a region which, as has been stated above, provides not less than 90 per cent. of the total world production at present. The supplies from the South American countries which are the original home of the plant, are now negligible.

The genus *Cinchona* is a native of the Andean region and grows in a wild state on the eastern afforested areas of that region, between latitudes 10°N and

9°S., in the Republics of Peru and Bolivia. There are 65 species of the genus *Cinchona* listed in *Index Kewensis*, and all are characterized by possessing bark containing the quinine alkaloids to a greater or less degree. The classification has presented some difficulty to botanists, owing to the ease with which the species hybridize with one another, so giving rise to different forms. There are, however, only four species which are, or have been, cultivated to any extent for their alkaloids. These are *C. ledgeriana* Mones ex Trinen which is also known as *C. calisava* Wedd var., *ledgeriana* Howard from which Ledger Bark is obtained; *C. succirubra* Pavon ex Klotzsch, which produces Red Bark; *C. calisava* Wedd., yielding Yellow Bark; *C. officinalis* Lin. giving Crown Bark or Lcxa. Nowadays practically all the *Cinchona* bark of commerce is obtained from *C. ledgeriana* and *C. succirubra*. Cowan gives the following average percentages of the three main species as grown in India:

	Quinine.	Other alkaloids.	Total alkaloids.
<i>C. ledgeriana</i>	5.49	3.03	8.52
<i>C. officinalis</i>	2.93	2.07	5.00
<i>C. succirubra</i>	1.40	4.85	6.25

Analyses of the bark indicate that *C. ledgeriana* is richer in quinine than any other species, but that *C. succirubra* possess a high total content of alkaloids, particularly in cinchonidine. These facts are of great importance in connection with the establishment of the planting industry, as naturally efforts have been made to cultivate *ledgeriana* on account of its high quinine-content, in spite of the fact that it is more particular in its requirements and is less easy to grow than the other species.

Today the Ceylon industry is dead. In India, the position was in some ways similar to that in Ceylon, with the difference that Government-owned plantations were maintained in the Nilgiri Hills of Madras and in the North-East of Bengal on the Sikhim border. These two regions are still the centres for quinine production in India, but private enterprise has ceased and only the Government plantations remain. At the height of the boom in 1880 it was estimated that the Government and private plantations in the Nilgiris and other parts of Southern India amounted to 5,800 acres, with a production of 400,000 lb. of dry bark per annum. In all parts of India the slump in prices caused by over-production saw the elimination of private plantations during the next decade.

There were essential differences in the management of the Government plantations in Madras and Bengal. In Madras, the policy had been to grow *succirubra* and to a less extent *officinalis* and *robusta*—species possessing a much lower quinine-content than *ledgeriana*, because conditions of soil and climate seemed to suit them better than *ledgeriana*. In Bengal, on the other hand, the value of *ledgeriana*, on account of the high quinine content of its bark, was realized from the time when the first small consignment of seed had been secured with so much difficulty, and efforts were largely concentrated on the problem of establishing this species, so that up to the present time by far the greater part of the area is still planted with *ledgeriana*.

In India the sequence of operation is as follows:— A suitable area of virgin rain-forest is selected and felled during the cold season (November to March). If steep, this land is terraced and staked 4×4 feet to mark the sites of the young trees which are planted out from the nursery beds in specially prepared holes during May and continuing for the next two months when rainy conditions prevail. In Darjeeling light shade-trees only are needed, but heavier shade is

required in Madras and Burma. Seedlings are raised and used as plants, and although experiments with grafting have been made, the practice of planting out seedlings still prevails in India. The soil of the nursery-beds is carefully prepared from leaf mould collected from the forest. It needs to be worked to a fine consistency, since the seed is very small and light and one ounce will give 20,000 seedlings. It germinates in about three weeks. The nursery-beds are sheltered by sloping roofs of thatch to protect the young seedlings from heavy rain or sun, and seeds are sown in March. They must be carefully watered with a fine spray at regular intervals. The seedlings are transplanted twice, first when the seed-leaves are just fully expanded to a distance of 1 inch apart, and later at the age of three months, in May and June, when they are 2 or 3 inches high, and then spacing is 3×3 inches. They are planted out after they have been in the nursery for two years, and a fortnight before they are transplanted, the roofing of thatch is gradually removed to harden off plant. The young plantation is cleared about twice a year for the first two or three years, but later periodical hoeing round the tree is all that is required. Harvesting of the bark begins about the fourth year when thinnings and prunings are dealt with. The final uprooting is made in the 10th year, as the figures indicate that a ten-year rotation gives the greatest return in quinine per unit of area. At the final harvest the whole tree is uprooted and the bark stripped from roots, stems, and branches which is then dried, stored, and passed to the factory. This method is said to give better results than a system of coppicing, which has also been practised.

Research has played a vital part in the Java industry from the early days. In a recent report to the Imperial Council of Agricultural Research for India, the need for systematic research on similar lines in India is stressed. It is recognized that the soil conditions and rainfall distribution is not so favourable in India as they are in Java, but it is believed that a properly organized research station ought to be able to raise the percentage to seven within a reasonable time.

Attempts to graft *ledgeriana* on to *succirubra* stakes in India have met with indifferent success up to the present but it is suggested that three-quarters of the failure is due to ignorance of the correct technique. In Java, trained artisans can make over 200 grafts a day with an astonishing degree of success, and there seems little doubt that with perseverance and due encouragement, similar results ought to be obtainable in India.

In India the present position is that the possibility of extension in Bengal is very limited, whilst in Madras new areas are being tried out in the Anamalais, and a recent report by Wilson and Mirchandani indicated that enough first class land existed for an early resumption of *Cinchona*-growing, about 38,000 acres of first class land being available in Bengal, Assam, Orissa, Bhutan, Sikkim, Madras, Mysore and Coorg. The production of *Cinchona* by planters has now practically ceased. The old plantings in the Darjeeling district have long ago been replaced by tea and those in Southern India have been grabbed up and abandoned or replaced by coffee or some other crop. Further recent attempts to interest the planting community in this crop have not proved successful. A manifesto addressed to the Government of Madras by the Planters' Association, as lately as August 1938, laid down the following conditions as essential to any such project :—

1. A guarantee to absorb the production from *Cinchona* estates, provided the bark is of good quality.
2. A guarantee to pay the market rate subject to a fixed minimum.

3. Partial remission of land assessment on areas planted with Cinchona for a certain period.

4. The planters to guarantee not to sell their bark to anybody except the Government.

5. Government to have the right to limit the areas to be planted.

The matter of a guaranteed minimum price had been the subject of repeated representations from 1895 onwards, and finally in 1925 the Government refused. Accordingly, after an agreement with the Planters' Association, new lands in Anamalai Hills were opened up by Government in 1925 in order to supplement the supply of bark from the Nilgiri plantations. These new plantations appear to be doing well and unlike other areas in South India, the *ledgeriana* species seems to be doing better. There the matter rests at present.

(*Emp. Jour. Expt. Agric.* Vol. IX, No. 34, 1941.)

Increasing the feeding value of cereal straws. By S. J. Watson. Straw in its natural condition can be used to some extent to replace the hay that was fed in pre-war conditions, but its value for this purpose can be increased greatly. In its early stages the digestibility of the cereal plant is high. At this stage, the digestibility of the cell-wall cellulose is about 80%. As the cereal plant matures lignification takes place. Lignin, which is not digested by farm animals, is deposited around nitrogen free extractives (soluble carbohydrates) and protein and it protects them from the action of the digestive juices. Though straws are fairly rich in mineral matter, a high proportion of this is of no value to animals.

Straw is often chaffed and mixed with pulped or fingered roots, wet grains, wet beet pulp or molasses, and is allowed to stand for some time in a heap. This results in a partial softening of the straw itself, but there is no evidence of any appreciable increase in feeding value. To achieve the latter, the following simple process was adopted for farm use.

200 lb. of chopped straw were immersed in 200 gallons of 1.5% solution of caustic soda and left for a period of about 20–22 hours at the ordinary temperature. In the treated straw, cell-wall swells up and the cell cavity is filled up. The cells are separate and distinct and the surface layer of cells has broken down and these structural changes facilitate the digestive agents to act on all parts. Trials with sheep have confirmed the increase in digestibility. The starch equivalent value in the different treated straw-pulp is nearly doubled after the treatment.

The farm plant for treating the straw consists of a soaking tank without outlet, a ramp on which the treated straw pulp is allowed to drain and a tank used for washing the straw.

Where large quantities of straw pulp are fed, the stock should be provided with rock salt and a suitable mineral mixture of steamed bone flour and precipitated chalk to correct the deficiency in lime. *Jour. Roy. Soc. England.* Vol. 101.

Studies in soil cultivation. IX The effect of inter-row tillage on the yield of potatoes. By H. C. Pereira. Three primary comparisons were made for three years. In one, the weeds were removed without any appreciable mulch being produced. In the second, the weeds were removed by grubbing, thus maintaining fine tilth. The third was the usual practice in preliminary grubbing and then a second grubbing followed by earthing up. A second object of the experiment was to find the effect of surface mulching on the moisture content of soil.

In 1937, four times grubbed and ridged up plots gave 12.36 tons per acre while the no-grubbing plots gave 12.33 tons. Thus inter-row grubbing appears to benefit the crop only in the removal of weed competition. The sub soil ploughing had no effect on the crop yield or size of tubers. The most striking result of

1938 experiment is that the means for the four weed free motor hoed treatments showed no response by the crop to 6 cultivations, 2 cultivations and no mulching. Ridging does not appear to encourage the crop. The extra grubblings produced little or no effect although there is a slight indication that the treatments may have effect when given earlier.

The blocks receiving 2 grubblings and 2 grubblings plus hand elimination of weeds showed the deleterious effect of weeds in the early stages of crop growth. In one case the reduction in yield was 43.4%. Competition for moisture was the principal reason for weed damage.

In the 1939 experiments, the grubbing depths were varied to include both 3 and 6 inches. This year also, where weeds were removed, there was no response to grubbing and earthing up. The weedy plots gave a significantly lower mean yield than the weed free plots.

The correlation (r , 0.263) between weed density and reduction in yield is insignificant for 8 pairs of values.

The fertiliser placement did not appear to give any marked effect on any of the treatments, though there was a suggestion that the effect of weed competition was less noticeable on the yield when the fertiliser was placed closer to the plants.

A study of moisture contents in plots receiving frequent mulching and no-mulching showed a mean loss of 0.26% moisture in 1937 and a mean gain of 0.22% in 1938, both the data being within the experimental error. The three years' results from 1937 to 1939 showed a mean reduction of 0.06% of moisture in un-mulched soil. The mulch thus had absolutely no effect on the moisture content of the first 18 inch of soil. Mulching may, however, cause a definite loss of water as compared with clean weeded land if the water table is near the surface; this is against what the traditional capillary hypothesis would predict. Mulching does conserve moisture if the comparison is made between clean mulched land and weedy land. *Jour. Agri. Sci.* Vol. 31, Part 2, April 1941.

Gleanings.

Sources of Tobacco Diseases. Diseases rank as one of the major problems in the production of tobacco. To assist the growers in this connection the Dominion Experimental Farms Service and the Laboratory of Plant Pathology of the Science Service, Harrow, are carrying on extensive research work, state R. J. Haslam, Assistant Superintendent of the Experimental Station, and L. W. Koch, Plant Pathologist in charge of the Laboratory.

In the case of those diseases where the causal organism is definitely known, source of an outbreak on a grower's farm can often be traced to some improper practice. In this connection the seed, planted and crop residue have been found to be potential sources of infection for the more common diseases. Few diseases are borne by the seed kernel, but chaff particles or foreign material mixed with the seed may be the cause of carrying disease organisms such as leaf spots and mosaic into the planted. It is advisable, therefore, to sow seed of good germination that has been properly cleaned.

Frequently during the late summer and autumn, weeds are found in and around tobacco beds. These are often the source of certain tobacco diseases because certain weeds are subject to the same diseases as the tobacco plant, and in the presence of either appropriate weeds or tobacco plants disease organisms tend to accumulate. As a precautionary measure, therefore, plantbeds should be cleaned up as soon as transplanting is completed. Weeds that appear later

in the season should be destroyed together with trash that tends to collect in and around the beds. Cleaning up practices are most effective if carried out in advance of steaming the soil, because disease organisms that enter the soil after steaming meet with less competition from harmless organisms and, therefore accumulate more rapidly. Unless these precautionary measures are taken, the money expended on steaming may be lost.

Tobacco beds situated adjacent to the curing barns are likely to be contaminated from tobacco residue which sometimes is allowed to accumulate inside the barn. When the tobacco is removed from the barn for stripping, any residue remaining should be cleaned up. If diseases such as mosaic and leaf spot have been a menace in previous years, it would be advisable to shift the location of the tobacco beds or disinfect the inside of the barn and any woodwork around the beds with a 2 per cent solution of formaldehyde. This will remove the possibility of the beds becoming contaminated.

Tobacco stalks, if not properly handled, may be a source of infection for mosaic and leaf diseases. In the case of flue-cured tobacco the stalk cutter and a cover crop of rye are recommended rather than leaving the stalks dry and uncut during the winter months. Stalks from air-cured tobacco should not be spread on fields where tobacco will be grown the following year.

Finally, the tobacco grower should be careful not to throw diseased tobacco materials into manure piles later to be applied to prospective tobacco ground, since leaf spots and mosaic may be spread in this manner. (*Indian Farming*, 2:440 and 441, 1941.)

Grass Seeding by Airplane. In the United States the airplane is now used as a seed planter as well as an insect duster in pest control. The Soil Conservation Service is credited with the bright idea. A lot of rough country had to be grassed, and ordinary methods of seeding were found either impracticable or too costly. With a 20-inch rainfall it was considered that a good growth of grass could be obtained and which would provide a protective cover which would be useful in preventing surface soil wash, as well as good grazing for stock. The question arose as to the best way of broadcasting grass seed over a large area, and it was decided to try seeding by aeroplane. An air-line firm took on the job, and for the purpose reconstructed the interior of a small cabin passenger plane, making room for a hopper with a capacity of 500 lb of grass seed. Test flights were made with the hopper loaded with sawdust, to see how the idea was likely to work. Further test flights were made using grass seed, and the seed distribution was checked on long strips of muslin. The tests proving satisfactory, actual seeding of a large area was carried out by flying at a height of 300 to 500 feet, so that the grass seed was distributed in a swathe about 100 feet wide. The flight lines used were 100 feet apart and the country was cross-seeded to ensure proper distribution. A man on the ground indicated the flight lines to the pilot, checked the distribution of the grass seed and flag-wagged the plane from the job when the wind scattered the seed too widely. The best times for seeding were found to be from daybreak until about 10 o'clock in the morning and from about 4 o'clock in the afternoon until dusk. Altogether about 6,000 lb of grass seed was broadcast in ten hours of flying time distributed over three days. The area seeded was just under 3,000 acres. Both distribution and germination of the grass seed were considered highly satisfactory. The cost of seeding was not too much and should be considerably less for large areas and for country not so broken. Whether adaptable to other conditions or not, or even if the method is regarded as fantastic, the tests and their practical application provided a lot of useful information and established the feasibility of adding one more peaceful and beneficial use for the airplane.

(*Queensland Agri. Jour.* Vol. LVI, Part I, July 1941.)

Minor Elements in Sewage. At the Milwaukee (U. S. A.) sewage disposal plant dried activated sludge is produced at the rate of 100 tons per day and sold as a fertilizer.

The results obtained from the use of this material indicated appreciable benefits apart from those due to the 6 per cent. of nitrogen and 2.5 per cent. of available phosphoric acid present in the material.

These results were most noticeable in very sandy soils, where striking benefits from the use of boron, copper, manganese and zinc had been reported. It was, therefore, believed that these minor nutrient elements might account, at least in part, for some of the favourable effects produced by the sewage product.

An extensive series of analyses of the material revealed the presence of twenty-three elements, a number of which are concerned in plant nutrition. Significant amounts of boron, copper, manganese and zinc were found to be present in an available form as determined by extraction with a solution of carbonic acid. The results of the investigation showed clearly that, when used as a fertilizer or as a constituent of mixed fertilizer, the sewage product can serve as a source of the minor nutrient elements required by plants.

[*Agri. Gaz. New South Wales*, Vol. 52: 374, 1941].

Reviews.

Report on the Marketing of Eggs in India and Burma, Abridged Edition, issued by the Agricultural Marketing Adviser to the Government of India. Manager of Publications, New Delhi. Price 8 annas.

The readers of the *Madras Agricultural Journal* will remember that the Agricultural Marketing Adviser to the Government of India published last year his report on the marketing of eggs in India and Burma and that we published under abstracts in the February number of 1941, pages 74—78, salient features in the report. The abridged report serves a very useful purpose in that it gives in brief the noteworthy features dealt with in detail in the main report so that this edition is of special interest to schools, poultry farms and other institutions connected with the development of cottage industries and rural development. The Agricultural Marketing Adviser has brought out the abridged edition not only in English, but also in Hindi and Urdu, and these are also priced only eight annas a copy and are available at all Government Book Depots and in the Office of the Manager, Central Publication Branch, New Delhi. It is needless to point out how invaluable the Hindi and Urdu edition must be to the masses who cannot read English. Apart from the fact, the introduction, the inter-chapters and the final chapter of the main report are reproduced in this, various questions arising out of the plates, diagrams and maps are directly answered and these bring out most of the salient points of the main report. However, if one wishes to have fuller information on any point, the relevant portion and appendices of the main report must invariably be consulted—*Editor*.

Report on the Marketing of Tobacco in the Madras Presidency, by K. Gopalakrishna Raju and S. N. Venkataraman; Superintendent, Govt. Press, Madras. Price Rs. 2/8.

It may be remembered by the reading public that in the year 1939 the publication of an All-India Market Report for Tobacco was issued by the Agricultural Marketing Adviser to the Government of India. This was taken advantage of and the report of the market survey of tobacco in the Madras Presidency which

was first prepared in 1936, has been now made up-to-date and released for publication. The readers of the Madras Agricultural Journal may also call back to their minds, the interesting facts and figures that were published on the marketing of tobacco under Agricultural Jottings in the April issue of 1938, pages 144 to 148. Since that date more information has been gathered on the subject and this publication, which has brought them all together and put them in a manner that could be easily understood by the layman, is a valuable asset to the tobacco grower. It is most interesting to note that the Madras Province produces annually about 250 million pounds of tobacco, which is a fifth of the Indian production, and in material value it works to a figure of 5 crores for Madras while the figure for the whole of India is 18 crores. Taking into consideration the total exports, in 1938-39 the figure for Madras was 89 million pounds. Exports are made up of both manufactured tobacco products and raw tobacco. From the report, one can easily see what an important money crop tobacco is. The most important feature of tobacco cultivation in this Presidency is the remarkable expansion of cigarette tobacco, which it may be remembered, has had its small beginnings in 1920 and since then rose to a lakh of acres during 1938-39. It is a matter for pride that the entire crop of Virginia tobacco in India is from this Presidency. The report gives detailed information in regard to several aspects of marketing from the producer on to the final consumer or manufacturer, and contains several valuable facts and figures which throw plenty of light on the subject. For a quick grasp of the report it is suggested the reader refers to inter-chapters at pages 52; 74; 96; 110; 122; 130; 138; 150; 157; 175 and 182. The last inter-chapter, contains a beautiful summary of conclusions and recommendations—*Editor*.

Correspondence.

To

The Editor, The Madras Agricultural Journal.

Sir,

Tamarind seeds as Manure.

In some parts of the Salem District there is a concentrated production of tamarind. In Krishnagiri, the seeds are fried in pans over a fire and the husk removed by pestle and mortar. The husked seeds are exported for cattle food and the husk used as manure. At Palacode, in the Dharmapuri taluk, whole seeds are used as manure for paddy. Ten to twenty bags of seeds are spread in the puddle before transplanting. These rot in the course of a few days and get incorporated in the soil. It is said that these form good manure especially for alkaline soils. It is reported that tamarind seeds contain 2 to 2.5% Nitrogen and 0.4 to 0.5% Phosphoric acid and thus possess a manurial value.

R. Chockalingam Pillai,
District Agricultural Officer, Salem.

To

The Editor, The Madras Agricultural Journal.

Sir,

Glimpses into Rural India.

It is needless to say that the present days are so hard that there is a very keen struggle for existence everywhere, and no one feels the pinching hunger in a greater measure than does an average villager. A kind-hearted man may give the hungry something to satisfy their hunger at a time. The next day the hunger will be there and another man out of generosity may do the same, but hunger, an eternal trouble, will always be there with perhaps, none to help at all

times. It is, therefore, wise to find out ways and means to get sufficient from one's own soil to satisfy his hunger and meet other requirements of his daily life. The usual cry, 'improve the lot of the villagers', which we hear from press and platform bears testimony to the realization on the part of the Government and the leading class of men, of the hunger and distress the villagers are subject to. Efforts are being made to some extent by the Government and many dutiful sons of this mighty land of India to relieve the villagers from this distress. But this is not enough.

Any amount of food or cash will not help a villager unless he is taught to help himself in this struggle to lead a life free from distress. We, villagers, today, are wasting a great deal of our wealth through ignorance. Wealth equivalent to crores of rupees is drifted into the Bay of Bengal and the Arabian Sea through soil erosion. Exposure of the farm yard manure to the scorching sun pelting rains brings about the loss of fertility worth millions of rupees every year. An average villager finds the quantity of manure the same before and after its exposure to the sun and remains in blissful ignorance of the loss of ammonia which is so vital to the production of a profitable crop. The house and farm refuse which can be composted and profitably used to enrich the soil generally accumulate around the houses and afford breeding place to mosquitoes which transmit many diseases to their victims, the villagers. The average villager today is so poor and ignorant that he cannot realise the huge waste that takes place around him every day. One who opens the eyes of an ignorant person to see the loss he suffers and educates him to avoid it, does much more to relieve him from distress than the one who freely gives him food from time to time. Human excreta when handled carefully and used to enrich the soil will add to the national wealth by at least fifty crores of rupees in this country, every year.

After learning to prevent wastage, there remain many things the study of which will help to add to the usual income of the villagers. Improved seeds in the place of the ordinary ones in crop production will increase the income of the *ryots* by ten to twenty percent. without incurring any additional expenditure. The Agricultural Department have done a great deal to help the *ryots* in this direction. Introduction of seeds from the Agricultural Research Stations has increased the yield of the land considerably. Ever since *Paramba navare* seeds found its way into this village more hill slopes have been brought into cultivation. More than seventy five tons of rice worth Rs 10,000, at least, is grown on *Kumari* lands of this village of Marnad when growing rice on hill slopes was unknown about a decade and a half ago. Green manure crop following rice plays an important part in enriching the soil and preventing erosion. Fruit culture which is still in its infancy will not only add to the income of the *ryots* but provide labour to the average villager, and result in the disappearance of many evils among the people when they learn to use their spare time profitably. There are still a number of crops and practices which will add to the material progress of this country, and help to fight against poverty and ignorance. Since space limits the mention of these another opportunity will be taken to explain them.

The Agricultural Department which is best fitted to help the villagers deserves the close co-operation of the educated public. A propaganda officer cannot, all of a sudden persuade a *ryot* to adopt improved methods of agriculture or use improved seeds, as he is held tightly within the dreadful jaws of ignorance. The *ryot* can, at the most imitate but not initiate. The approach of the villager through the few educated people is bound to crown the efforts of the Department with success.

Basel Mission Farm, }
 Moodbidri, S. Kanara, }

Yours etc.,
 A. G. Soans.

Crop and Trade Reports.

Statistics—Crop—Groundnut—1941—Third Forecast Report. The average of the areas under groundnut in the Madras Province during the five years ending 1939-40 has represented 45·2 per cent. of the total area under groundnut in India. The area sown with groundnut up to 25th September 1941 is estimated at 2,076,500 acres. When compared with the area of 3,142,900 acres estimated for the corresponding period of the previous year, it reveals a decrease of 33·9 per cent. The decrease is general outside Malabar and is due mainly to the propaganda for the restriction of groundnut cultivation. The decrease in area is marked in Guntur (-95,000 acres), Kurnool (-218,000 acres), Bellary (-156,000 acres) and Anantapur (-89,000 acres) where the sowing rains also were in defect.

The summer crop throughout has been harvested. The yield was normal except in South Arcot, Chittoor, North Arcot and Tanjore where it was below normal on account of drought. The yield of the early crop was normal in Salem and Coimbatore. The condition of the main crop is reported to be satisfactory outside the Circars (Vizagapatam excepted), the Deccan and Chingleput where it was affected by drought to some extent. In parts of Bellary and South Arcot the crop suffered to some extent from attacks by insect pests.

The wholesale price of groundnut (machine shelled) per imperial maund of 82 2/7 lb. equivalent to 3,200 tolas) as reported from important market centres on 6th October 1941 was Rs. 4-12-0 in Vizagapatam and Guntur, Rs. 4-9-0 in Tadpatri, Rs. 4-8-0 in Vizianagram and Cuddalore, Rs. 4-2-0 in Vellore, Rs. 4-1-0 in Cuddapah and Coimbatore, Rs. 4-0-0 in Nandyal, Rs. 3-14-0 in Hindupur, Rs. 3-12-0 in Salem, Rs. 3-10-0 in Bellary and Rs. 3-9-0 in Adoni and Guntakal. When compared with the prices published in the last report, i. e., those which prevailed on 4th August 1941, these prices reveal a rise of approximately 16 per cent. in Nandyal, three per cent. in Tadpatri and one per cent. in Vizagapatam and a fall of approximately 38 per cent. in Guntakal, 20 per cent. in Vellore, 17 per cent. in Adoni, 12 per cent. in Cuddapah, 11 per cent. in Bellary, 9 per cent. in Hindupur, 8 per cent. in Vizianagram and Cuddalore, 6 per cent. in Salem and 3 per cent. in Guntur.

(Director of Industries and Commerce, Madras).

Cotton Raw, in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 3rd October 1941 amounted to 574,935 bales of 400 lb. lint as against an estimate of 503,500 bales of the total crop of 1940-41. The receipts in the corresponding period of the previous year were 447,473 bales. 506,452 bales mainly of pressed cotton were received at spinning mills and 59,387 bales were exported by sea while 95,980 bales were imported by sea mainly from Karachi and Bombay.

(Director of Agriculture, Madras).

Press Note.

Increase in Production of Rice and other Food Crops. In the Madras Presidency, though seventy-five per cent. of the area cropped is normally cultivated under food crops comprising paddy, millets and pulses, yet in 1939-40 rice was as usual, imported from Burma, Siam and Indo-China, to the tune of nearly 900,000 tons to support the population. For some months past, owing to inadequate shipping facilities, imports of rice are irregular and inadequate to meet the full requirements of the Province. Recently the war zone has extended nearer

to India and if the unsettled conditions in the East should develop, transport of rice across the seas from Burma, Siam, etc., might cease altogether.

2. Under these circumstances, every cultivator and landowner in the Presidency should remember the old adage, *Forewarned is forearmed* and bestir himself to increase the production of food crops from his holding to the utmost by intensive and extensive cultivation. In this great economic warfare of today, production of adequate food grains within the country is as important as the manufacture of arms and ammunitions. Food crops like paddy, ragi, cholam, cumbu korra, etc., could firstly be extended over larger areas by bringing new lands under the plough or replacing commercial crops like groundnut, tobacco, etc., that depend upon foreign countries for their disposal or adopting the practice of mixed cropping of suitable millets with the commercial crops; secondly, the acre yields of these crops, particularly under irrigation, can be increased by intensive methods of cultivation.

3. In this Presidency, there is not much unoccupied area for profitable cultivation under unirrigated conditions and in the case of irrigable lands, the extension of the area is limited by water supply from rivers and tanks. But certainly the area under commercial crops, like groundnut, tobacco and sugarcane now cultivated under irrigation can be appreciably reduced to make room for growing suitable grain crops. Commercial crops grown under rainfed conditions can also be sown mixed with suitable millets so that every acre of land is utilised to produce some quantity of food, however small it may be per acre, which on the aggregate will go to make up the deficit in imports.

4. For increasing the output of food crops in the areas now under cultivation, manuring especially for the irrigated crops is, so to say, the hand-maid of the cultivator and should be judiciously utilised to enhance his crop outturn per acre. In Madras about 10 million acres are devoted to food crops under irrigation and of this area, 8 million are occupied by paddy and the other two millions are cropped with ragi, cholam, cumbu, korra or tenai. It is in fact this irrigated area that contributes to make up the bulk of our home-grown staple food and if every acre of the irrigated land is adequately and systematically manured, there will be no room for any anxiety to meet the anticipated deficit in our food supplies. In the case of paddy lands, producing an average crop of 2,500 to 3,000 lb. per acre in the 1st crop season an increase of 10 to 20 per cent. is ordinarily obtained by manuring with 2 or 3 full cartloads of green leaf (4,000 to 6,000 lb.) or 400 to 500 lb. of oil cakes (groundnut, castor and neem cakes) costing about Rs. 10 per acre, while with the same rate of manures the lands now producing between 1,500 to 2,000 pounds, can be expected to yield an increase of 20—30 per cent. If green leaf is not available in sufficient quantities it may be supplemented proportionately with any of the oil cakes available cheaply in the locality. As a result of the war the price of oil cakes for want of export trade in oil seeds has come down to the economic limit and the expenditure on manuring will pay twice the outlay. Similar application of manure to the second crop paddy grown in the periods, September to January, or January to April, will enhance the yield by 30—50 per cent. over unmanured plots. Unfortunately, bulk of the area under paddy in the deltaic tracts is not normally manured. Lands close to villages and lands cultivated by the owner himself are regularly manured. On the whole, the proportion of regularly manured lands form a very insignificant part of the total area under the crop. If only every landlord and tenant cultivator come to a common understanding to share the expenditure amounting to Rs. 10 per acre on manuring they not only get back Rs. 20 worth of produce to share between themselves, but above all they will have contributed to convert their Rs. 10 investment into grain worth Rs. 20 which is so essential to sustain the population in this hour of need. Landlords, who know their tenants personally, can

invest or advance them the necessary money for manuring and get back the sum at harvest time. Banks are now offering credit at cheap interest and oil cakes are now cheaply available. Price of produce is also fairly high. This is an opportunity both for landlords and cultivators to profit themselves, while serving at the same time the larger interests of the country by producing more food.

5. The value of manure is further enhanced by cultivating high yielding strains that the Agricultural Department has been distributing. Unlike crops grown in rainfed areas yield of paddy grown under swamp conditions in puddle increases with the closeness of planting say 4" to 6" according to the duration of the crop and fertility of the soil. Kar and Kuruvai varieties are to be planted 4" apart while long duration Samba varieties may be planted 6" apart two seedlings per hole. The denser the crop grows, the higher is its final yield; because, the total yield from a unit area depends on the number of tillers produced in that area. The individual performance of plants planted wide though attractive, the final yield of the widely planted crop will be disappointing. If, for any local reason, wide planting is found necessary it is advisable to plant three or four seedlings per hole.

6. It is earnestly hoped that absentee landlords, tenant and land-owning cultivators of this Province will co-operate with one another and seriously consider the problem of increasing the production of food crops, paddy, cholam, ragi, cumbu, korra, etc., in the land they cultivate or own by adopting one or other of the five following recommendations.

1. Wherever possible, consider the replacement or reduction in the area under commercial crops with suitable food crops, paddy or millets;
2. Sow millets as a mixture with commercial crops that cannot be wholly replaced in rainfed and garden land area;
3. Manure every acre of crop cultivated with the aid of irrigation;
4. Seek high yielding strains that the Department is advocating in the area;
5. Adopt close planting of paddy when grown under wet puddle condition.

Director of Agriculture, Madras.

College and Estate News.

Students' Corner. *Tour.* The final year students of the college were out on an agricultural study tour from the 2nd to the 15th October visiting the following places:—

Guntur. The Agricultural and Livestock Research Station, Lam, the tobacco market yard, the Majetty Tobacco factory and the village of Angalakudum, where they were entertained at dinner by the Commissioner of the Guntur Municipality.

Nellore. Rice Research sub-station, Buchireddipalem, Kanigiri Reservoir and Rice grading centre.

Koduru. The Fruit Station, neighbouring nurseries, orchards, fruit growers association and grading of oranges.

Katpadi. The American Arcot Mission Farm where poultry breeding is done on a large scale.

Gudiyattam. The sugarcane research station.

Bangalore. The Imperial Dairy Institute, Hebbal Farm, Horticultural Gardens, Serum Institute and Indian Institute of Science.

The district officers of the Department in the respective places and those in Bangalore made all possible arrangements to make the tour as instructive and comfortable as possible. The party were accompanied by Sri. K. Raghavachari, Junior Lecturer in Agriculture and Sri. S. V. Duraiswami, Teaching Assistant.

Cricket. The first match of the Rhondy Shield Cricket tournament was played on the 26th August between our College eleven and the Government College, Coimbatore. Our College scored 79 runs while the visitors scored 96 runs and thus won the match. The second match of the tournament was played on the 18th October between our College and the Victoria College, Palghat. The visitors won the match by scoring 127 runs against 54 scored by us.

University Extension Lectures. Under the auspices of the University of Madras, Mr. J. J. De Valois, B. Sc., Principal, A. A. M. Agricultural Institute, Katpadi, delivered two interesting and instructive lectures on the 17th and 18th October on "Livestock and India's Economic Development" and "God's greatest gift, the Soil—production and care". Mr. R. C. Broadfoot, Principal and Gulam Dastigar Sabib Bahadur, the District Educational Officer, Coimbatore, presided over the meetings, on the first and second day respectively. Both the meetings were well attended.

The Refresher Course. The officers that attended the refresher course were taken by the Research Engineer to the Radio Institute of Mr. G. D. Naidu; he gave them tea and showed them round and explained the interesting work that is being carried on there. They were entertained at tea by the Heads of Sections at the College on the 13th. The course was completed on the 15th and most of the officers left the estate the same evening. During their stay here the Managing Committee of the Union approached and enlisted many 'old boys' as members of the Union. It is hoped that similar response will be forthcoming from other 'old boys' who are not members of the Union at present.

M. Sc. Degree. We are very glad to note that the University of Madras, has awarded the degree of M. Sc. on Sri. T. N. Ananthanarayanan, B. Sc., Ag., Assistant in Chemistry, Imperial Sugarcane Station, for his thesis on "The origin and geo-chemistry of the soils of Madras—Deccan", and on Sri G. Seshadri Ayyangar, M. A., Assistant, Cotton Section, for his thesis on "The origin of lint and fuzz in cotton". We offer our hearty congratulations to them.

Scouting. An ordinary meeting of the Group Committee of the Ramakrishna Scout Group was held on 17th September 1941. The report of the Secretary presented at the meeting indicated that about 10 gentlemen of the staff of the Agricultural College and Research Institute had just completed their scoutmasters' training and were ready to take up troop work on the College Estate. The strength of the Scout Group on the date of the meeting consisted of 37 scouts, 27 cubs and 6 rovers. A sum of over Rs. 60 had been promised as donation by the Estate residents of which about half had already been realised on that date. A set of By-Laws were also adopted by the Committee, and the accounts were scrutinised and certain items of expenditure were sanctioned.

Visitors. Mr. H. M. Hood, Second Adviser to H. E. the Governor of Madras and Mr. P. H. Rama Reddy, the Director of Agriculture, visited the Agricultural College and Research Institute, during the month.

RETIREMENT

RAO BAHADUR Y. RAMACHANDRA RAO

Rao Bahadur Y. Ramachandra Rao, Locust Entomologist, Imperial Council of Agricultural Research, and formerly Entomologist to the Government of Madras, retires from Service this month.

Yelseti Ramachandra Rao was born in a respectable Brahmin family in the village of Yelseti in the Bellary District on the 11th September 1885. His early days were, however, spent in the Tamil districts of Tinnevely and



Rao Bahadur
Yelseti Ramachandra Rao, M.A., F.Z.S.

Madura, where he had his school education. In 1900, while still a lad of fifteen, he left for Madras to join the Madras Christian College for his University education. He graduated in 1904 with distinction, and at this stage, making up his mind to pursue a scientific career, enrolled himself as a post graduate student in Zoology under Dr. Henderson. He took his M. A. Degree in 1906, and entered Government service the same year, as Assistant in Entomology, in the Madras Agricultural Department. After a period of training under Prof. Lefroy at Pusa for six months, Mr. Rao applied himself to the work before him and impressed his superiors with his earnestness, enthusiasm, keenness and painstaking diligence. A stickler for thoroughness he never did anything slip shod.

In 1916, the Government of India entrusted him with the task of making a survey of the insect enemies of Lantana, with a view to utilizing them for its control. This work which was extremely arduous by its nature entailing, as it did, a considerable amount of physical hardship, gave Mr. Rao opportunities to prove his worth as a first class field investigator, besides enabling him to enrich his experience of the insect world. The results of his enquiry were published as a memoir of the Imperial Agricultural Department, and in recognition of Mr. R. Rao's services the title of Rao Sahib was bestowed on him.

Mr. Ramachandra Rao was appointed as Assistant Entomologist in Iraq, in 1919, where he did a great deal of pioneer work on the insect pests of the date palm and other crop plants in Iraq.

He returned to India in 1921, and he was promoted to the Madras Agricultural Service, as Economic Assistant to the Government Entomologist in 1922.

When Mr. Ballard left India, Mr. Rao was appointed as Government Entomologist, which post he filled with rare distinction till 1930 when foreign service again took him away from Madras.

As Government Entomologist, Mr. Rao, had to shoulder heavy responsibilities. This period of Mr. Rao's career was characterised by the same enthusiasm, diligence and perseverance and strict regard for accuracy which he showed in his earlier years.

From December 1930, till the period of his retirement he was under the service of the Imperial Council of Agricultural Research, as Deputy Locust Research Entomologist at Quetta. In this capacity he attended the Third International Locust Conference in London as a delegate from the Government of India. The results of his labours on Locust work, have been written up and are awaiting publication. As an Entomologist in Madras he devoted his attention chiefly towards the economic side of the subject and among the more important items, the following are to his credit: (1) The trial of biological control of the coconut caterpillar pest. (*Nephantis serinopa*) with the aid of parasites. (2) The introduction of *Vedalia* beetles to check the wattle scale (3) the control of Mango hopper (4) the control of the Red

hairy caterpillar with the aid of legislation (5) the control of the Paddy army worm. Besides these he interested himself in the study of the pests of cotton and sugarcane. In reviewing his work, as an Entomologist, one must remember that Mr. Rao avoided the merely spectacular, and concentrated his attention on securing successful results in the field, with the result that his published work does not adequately represent his actual achievements. Himself a model of thorough-going efficiency, always hard-working and conscientious in the discharge of his duties he did not tolerate in his subordinates perfunctory or slovenly work. But extremely affable and endowed with the true spirit of science, Mr. Rao ruled his subordinates, with kindness rather than severity, by example rather than precept, that he was more loved and respected than feared.

Mr. Rao was deeply attached to the Madras Agricultural Journal and he was one of those who were mainly responsible for its secure foundation laid in the early years of its existence. He was the Editor of the Journal for three successive years, (1922—1924) and continued to be a member of Editorial Board till he left Coimbatore. He was also Secretary of the Officers' Club for two successive years. In the discharge of his work in these honorary capacities he exhibited the same zeal for thoroughness and efficiency as in his official work.

It is a great pity in the closing days of his official career an unfortunate domestic bereavement in the death of his promising young son deprived Mr. Rao of that peace of mind and happiness which are his due after years of strenuous and active life.

May God give him strength to bear the blow with fortitude and enable him to pass the rest of his days with equanimity and peace of mind.

K. UNNIKRISHNA MENON

Sri. K. Unnikrishna Menon is a distinguished Diplomat of the Saidapet Agricultural College. He was recruited to the subordinate service of the Madras Agricultural Department in May 1908. He worked in various capacities in different districts of the Presidency. He served as Demonstrator in Malabar, Farm Manager at the Taliparamba and Palur Farms, and after a period of training at the Teachers' College, Saidapet, as a Teaching Assistant at the Agricultural College, Coimbatore. He was promoted to the Madras Agricultural service as Assistant Director of Agriculture, Madura, in June 1922. After serving as District Officer in Tellicherry and St. Thomas Mount, and as Assistant Superintendent, Central Farm, Coimbatore he was promoted as Deputy Director of Agriculture in 1933. He was Deputy Director at St. Thomas Mount, Bellary, Madura, Tellicherry and Coimbatore. For a short period he was Head quarters Deputy Director of Agriculture at Madras. He was finally appointed as Senior Lecturer in Agriculture and Superintendent, Central Farm, Agricultural College and Research Institute, Coimbatore, in August 1940. He availed of leave in May 1941, preparatory to retirement, and retired from service in September 1941.

As a District Officer and Circle Officer he took keen interest in co-operative organisations and rural development. He was a hardworking, conscientious and sympathetic officer, and was generous minded to often overlook the faults and shortcomings of his subordinates. He is of a religious turn of mind.

He is one of the oldest members of the Madras Agricultural Students' Union and, whenever he happened to be stationed at Coimbatore, he took a keen interest in the affairs of the Union. He has helped the Union in various capacities in its management. He was the Vice-President of the Union during the year 1938—39.

We wish him a long and happy life in his retirement.

Weather Review—SEPTEMBER 1941.

RAINFALL DATA

Division	Station.	Actual for month	Departure from normal @	Total since January 1st	Division	Station	Actual for month	Departure from normal @	Total since 1st January
Circars	Gopalpore	6.2	-1.3	24.0	South	Negapatam	4.4	+0.6	10.9
	Calingapatam	10.6	+3.2	24.2		Aduthurai *	7.1	+4.0	14.6
	Vizagapatam	5.1	-1.4	21.3		Madura	3.0	-2.1	20.1
	Anakapalli *	5.6	-2.2	22.9		Pamban	0.5	-0.7	9.4
	Samalkota *	8.4	+1.3	30.4		Koilpatti *	4.5	+2.3	10.8
	Maruteru *	5.0	-1.0	24.6		Palamkottah	2.6	+1.3	10.1
	Cocanada	3.3	-2.5	38.6	West Coast	Trivandrum	11.1	0.0	65.2
	Masulipatam	4.7	-1.5	17.4		Cochin	13.4	+4.4	100.4
Ceded Distrs.	Guntur *	5.3	-0.8	13.9		Calicut	8.1	+0.4	112.7
	Kurnool	7.5	+1.3	12.4		Pattambi *	4.2	-3.3	109.0
	Nandyal *	8.4	+1.7	16.6		Taliparamba *	9.0	+0.6	98.3
	Hagari *	6.5	+1.7	12.5		Kasargode *	7.3	-1.7	94.5
	Siruguppa *	7.3	+0.9	18.9		Nileshwar *	7.8	-1.1	98.2
	Cuddapah	8.3	+2.0	19.3		Mangalore	11.1	+0.7	85.7
	Bellary	6.7	+1.6	19.1	Mysore and Coorg	Chitaldrug	4.9	+0.4	15.8
	Anantapur	7.7	+0.4	15.0		Bangalore	5.2	-1.8	22.5
Carnatic	Rentachintala	5.8		16.6		Mysore	7.0	+2.8	31.4
	Anantharajupet *	7.9	0.0	0.0		Mercara	9.6	-1.2	117.2
	Nellore	3.9	-0.9	10.1	Hills	Kodaikanal	8.3	+1.0	34.4
	Madras	7.6	+2.6	15.5		Coonoor			
	Palur *	9.6	+5.4	21.5		Ootacamund *	4.1	+0.5	32.6
Central	Tindivanam *	8.3	+3.7	15.1		Nanjanad *	4.7	0.0	43.4
	Cuddalore	7.5	+1.4	21.5					
	Vellore	10.0	+2.7	16.7					
	Gudiyattam *	5.7	-0.5	14.5					
	Salem	8.2	+1.6	25.2					
	Coimbatore	4.2	+2.7	18.9					
	Coimbatore								
	A. C. & R. I. *	2.6	+0.8	19.3					
	Trichinopoly	4.5	-0.3	11.1					

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated up to 1937 (published in Fort St. George Gazette).

Rainfall was widespread in the peninsula till about the 5th of the month and was associated with thunderstorms. On the 6th conditions became unsettled in the north and central Bay of Bengal with the passage of a low pressure wave across Burma from the East, and developed into a depression in the North-West angle of the Bay on the next day. This depression crossed the Coast near Bala-sore on the 8th and moving across the Central Provinces disappeared over Central India by the 10th. On the same day conditions were again disturbed in the North Andaman sea, which extended into the Central Bay of Bengal on the 11th, and concentrated into a depression centred at about 15°N and 84°E on the 12th and crossed the Coast and by the 14th morning lay as a diffused area of low pressure over Central Deccan. It persisted over the central parts of the peninsula till it disappeared over Bihar on the 21st. During the formation and passage of this disturbance, widespread rain occurred nearly all over the peninsula. The monsoon began withdrawing from Upper India about the 20th and had completely withdrawn from North-East India by the end of the month, and conditions became favourable for setting in of the North East Monsoon rains in the Madras Presidency. Rainfall during the month was well distributed over the presidency, and was generally above normal.

The chief falls recorded being :

Peermede (Travancore).	6.5"	(18th).
Kottayam (do.)	6.2"	(23rd).
Calingapatam	5.8"	(16th).
Anantapur	4.1"	(19th).
Hagari	3.9"	(23rd).
Cochin	3.8"	(18th).
Nandyal	3.3"	
Madras	3.1"	(1st)

Weather Report for the Agricultural College & Research Institute Observatory

Report No. 9/41.

Absolute maximum in shade.	...	91.8°F
Absolute minimum in shade.	...	69.5°F
Mean maximum in shade	...	88.5°F
Departure from normal.	...	-1.0°F
Mean minimum in shade.	...	71.8°F
Departure from normal.	...	+1.3°F
Total rainfall for the month.	...	2.58"
Departure from normal.	...	+0.79"
Heaviest fall in 24 hours	...	0.98"
Total number of rainy days.	...	6
Mean daily wind velocity.	...	2.2 M. P. H.
Departure from normal.	...	-3.0 M. P. H.
Mean humidity at 8 hours.	...	78.0 %
Departure from normal.	...	4.5 %

Summary: (For Coimbatore report).

The weather during the month was generally unsettled as is characteristic of the transition period, with thunderstorm activity during the first two weeks and again towards the end of the month. Rainfall was associated with thunderstorms, and totalled 2.58" or 0.79" in excess of normal. Day temperatures were below normal while night temperatures were above normal. Skies were in general heavily clouded and humidity in excess of normal. Wind movement was much weaker than normal.

P. V. R. & S. V. K.

Departmental Notifications.

Gazetted Service.

Postings.

Sri. K. Jagannatha Rao, Upper Subordinate, IV Grade, to act as District Agricultural Officer, Guntur, in Category 5 of Class I of the Madras Agricultural Service.

Sri. N. Subramania Ayyar, Officiating District Agricultural Officer on relief by Sri. K. Avudainayakam Pillai to officiate as District Agricultural Officer, Coimbatore, in relief of Sri. M. U. Vellodi.

Sri. V. K. Subramanya Mudaliyar, temporary Gazetted Assistant, Mungari Cotton Scheme, Adoni, on return from leave is posted to the same post.

Sri. K. Avudainayakam Pillai, Officiating District Agricultural Officer, on return from leave to officiate as District Agricultural Officer, Ramnad, Sattur.

Leave.

Sri. M. U. Vellodi, D. A. O., Coimbatore, l. a. p. for 1½ months from the date of relief.

Subordinate Service.

Appointments.

The following appointments of Upper Subordinates, Agricultural Section, III grade (new) are ordered :—

Sri. R. Soundararajan—Farm Manager, Central Farm, Coimbatore.

„ M. Atchanna Sastri—Farm Manager, Agricultural Research Station, Maruteru.

„ K. Dorairaj—Farm Manager, Agricultural Research Station, Siruguppa.

Transfers.

Name of officers	From	To
Sri. S. M. Kalyanarama Ayyar.	Asst. in charge Mungari Cotton Scheme, Adoni,	Asst. in Cotton, Cotton Breeding station, Coimbatore.
„ V. K. Kunhunni Nambiar,	F. M. A. R. S. Pattambi,	A. D., Udumalpet.
„ K. Govinda Kurup,	F. M., Central Farm, Coimbatore,	F. M. A. R. S., Pattambi.
„ K. Rangaswami Ayyangar.	F. M. A. R. S., Maruteru,	A. D., Sulurpet.
„ S. Muthuswami Gounden,	F. M. A. R. S., Siruguppa,	A. D., Srivilliputhur.
„ K. Dorai Raj,	A. R. S., Pattambi,	F. M. A. R. S., Siruguppa.
„ A. Venkatarangam,	A. D., Rapur,	A. D., Venkatagiri.
„ K. Meenakshisundaram,	F. M. D. F. S., Hagari,	A. D., Ambasamudram.
„ T. Ramanujulu Naidu,	A. D., Bhadrachalam,	Nuguru Agency.
„ V. Buchi Raju.	A. D., Nuguru,	A. D., Bhadrachalam.
„ P. S. Venkata-subrahmanyam,	F. M. A. R. S., Tindivanam,	A. D., Nellore.
„ R. Kolandavelu Naicker,	A. D., Peravurani,	F. M. A. R. S., Tindivanam.
„ M. J. David,	Asst. in Soil Physics, D.F.S. Hagari (on leave),	A. D., Tanjore District.
„ V. Achyutam Pantulu,	A. A. D., Rajahmundry,	A. D., Tiruvur.
„ Rangabrahma Rao Naidu,	A. D., Tiruvur,	A. D., Rajahmundry.

Leave.

Name of officers.	Period of leave.
Sri. R. Venkatarama Ayyar, Foreign service under the Groundnut Market Committee, Cuddalore,	L. a. p. for 2 months from 2-9-41.
„ D. Bapayya, Foreign service under the Tobacco Market Committee, Guntur.	Extension of L. a. p. for 3 months from 13-9-41.
„ V. Chidambaram Pillai, A. D. Sankarankoil,	Further extension of L. a. p. for 3 weeks.
„ M. Narasimham, A. D., Tenali,	Extension of L. a. p. for 1 month from 8-10-41.
„ V. Achyutam Pantulu, A. A. D., Rajahmundry,	L. a. p. on m. c. for 3 months from the date of relief.
„ V. Venkatadri Reddi, F. M., (on leave),	Leave on half average pay on m. c. for 6 months from 18-9-41.
„ R. Kolandavelu Naicker, A. D., Peravurni,	L. a. p. for 2 months from the date of relief.
„ N. C. Tirumalachari, A. D., Srivilliputhur,	L. a. p. for 1 month and 23 days from 1-11-41.
„ N. Ramadoss, A. D., Ongole.	Extension of L. a. p. for 1 month from 10-10-41.
„ Krishna Hegde, F. M. A. R. S., Nanjanad,	Extension of L. a. p. for 1 month from 18-10-41.
„ A. Venkatachari, A. A. D., Harpanahalli,	Extension of L. a. p. for 12 days and half average pay for 18 days from 5-10-41.

Agricultural College and Research Institute, Coimbatore.

Additions to the Library during the quarter ending 30th September 1941.

A. Books.

1. *Rothamsted Field Experiments on the Growth of Wheat*, Russel E. J. & Watson, D. J. (1940). 2. *Field Trials—Their Layout and Statistical Analysis*, Wishart, J. (1940). 3. *The Mineral Composition of Crops with Particular reference to the Soils*, Beeson, K. C. (1941). 4. *Preliminary Survey of Some of the Soils in Kenya*, Gracie, D. S. (1930). 5. *Vegetable Propagation of Tropical and Sub-Tropical Plantation Crops*, Fieldman, C. S. C. and Gamer, R. J. (1940). 6. *Plant Hormones and Their Practical Importance in Horticulture*, Pears, H. L. (1939). 7. *Fruit Juices and Related Products*, Charley, V. L. S. and Harrison, T. B. J. (1939). 8. *Preservation of Fruit Products, (in Telugu)*, Jogi Raju, G. (1941). 9. *Pandlu—Part 3—Orange Family, (in Telugu)* Jogi Raju, G. (1941). 10. *Fruit Culture*, Jogi Raju, G. (1941). 11. *Vegetable Gardening in Malaya*, Milsum, J. M. and Grist, J. D. (1941). 12. *Fruit Pectins—Their Chemical Behaviour and Jellying Properties*, Hinton, C. L. (1939). 13. *Nitrogen Supply to Tea*, Cooper, H. R. (1939). 14. *Grassland Investigations in Australia (Herbage Bulletin No. 29)*. (Contributions). (1940). 15. *The Control of Weeds*, White, P. O. (Editor). (1940). 16. *Farm Productions and Prices in the U. S. A. 1869-1937*, Stanes, F. & Bean, L. H. (1940). 17. *The Land Grant*

College Movement, Mumfore, W. B. (1940). 18. *Farm Animals--Their Breeding, Growth and Inheritance*, Hammond, J. (1940). 19. *Economic Survey of Palestine*, Horowitz, D. and Hinden, R. (1938). 20. *List of most Important Trees, Shrubs, Climbers and Herbs Occuring in the Forests of the Madras Presidency*, Seshagiri Rao, V. N. and Krishnaswamy, M. H. (1941). 21. *Chemical Investigations of Rhubarb Plants*, Vickery, H. B., et. al. (1939). 22. *Book of Indian Birds*, Salim Ali. (1941). 23. *Principles of Economics for Indian Students*, Brij. Narain. (1941). 24. *Correlation and Machine Calculation*, Wallace, H. A. and Snedecor, G. W. (1931). 25. *Function and Working of the Reserve Bank of India*, Taylor, J. B. (1941).

B. Annual Reports of Agricultural Departments and Experimental Stations.

1. Annual Administration Report of the Tea Scientific Department for 1940—41 (S. India). 2. 15th Annual Report of the Lalgudi Sivagnanam Co-operative Agricultural Society 1936—37 to 1939—40. 3. South India. Coffee Scientific Officer, Annual Report for 1940. 4. Annual Report, Travancore Agricultural Department, 1939—40. 5. Mysore Government Gardens Annual Report 1939—40. 6. Report of the Agricultural College, Nagpur for 1939—40. 7. 11th Annual Report of the Executive Council of the Engineering Imperial Agricultural Bureau 1939—40. 8. Cylon Coconut Research Scheme Annual Report. 1940.

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